WEBER COUNTY CORP.

WEBER COUNTY C & D LANDFILL

APPLICATION FOR CLASS IVb C&D LANDFILL PERMIT

PROFESSIONAL ENGINEER
1-19-2009
No. 169141-2202
KENT C.
STAHELI
STATE OF UTAH

Prepared by:

HANSEN, ALLEN & LUCE, INC.
Consulting Engineers
6771 South 900 East
Midvale, Utah 84047
(801) 566-5599

January 2009

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Prepared by:

Hansen, Allen & Luce, Inc.
Consulting Engineers
6771 South 900 East
Midvale, Utah 84047

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Prepared by:

Sagebrush Consultants, LLC
3670 Quincy Avenue, Suite 203
Ogden, Utah 84403

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SECTION I

INTRODUCTION

Weber County is applying for a Class IVb permit to construct and operate a construction and demolition landfill, the "Weber County C & D Landfill", which is anticipated to receive waste from and is to be located within the boundaries of Weber County, Utah. This application for Class IVb permit is submitted in accordance with the requirements of Rules R315-305, R315-302, R315-303, R315-309, and R315-310 of the Utah Solid Waste Permitting and Management Rules and the Utah Solid and Hazardous Waste Act (UCA 19-6-101 through 123).

SECTION II

PART I
UTAH CLASS IVb
LANDFILL PERMIT APPLICATION FORM

The following pages consist of the completed Utah Class IVb Landfill Permit Application Form.

Utah Class IV and VI Landfill Permit Application Form

Utah Division of Solid and Hazardous Waste

Solid Waste Management Program

Mailing Address
P.O Box 144880
Salt Lake City, Utah 84114-4880

Office Location
288 North 1460 West
Salt Lake City, Utah 84116

Phone (801) 538-6170
Fax (801) 538-6715
www.deq.utah.gov

APPLICATION FOR A PERMIT TO OPERATE A CLASS IV OR VI LANDFILL

Please read the instructions that are found in the document, INSTRUCTIONS FOR APPLICATION FOR A PERMIT TO OPERATE A CLASS IV or VI LANDFILL. This application form shall be used for all Class IV or VI solid waste disposal facility permits and modifications. Part I, GENERAL INFORMATION, must accompany a permit application. Part II, APPLICATION CHECKLIST, is provided to assist applicants and, if included with the application, will assist review. **Please note** *the version date of this form found on the lower right of the page; if you have received this form more than six months after this date it is* recommended you contact our office at (801) 538-6170 to determine if this form is still current. When completed, please return this form and support documents, forms, drawings, and maps to:

Dennis R. Downs, Director
Division of Solid and Hazardous Waste
Utah Department of Environmental Quality
PO Box 144880
Salt Lake City, Utah 84114-4880

(Note: When the application is determined to be complete, submittal of two copies of the complete application will be required.)

Utah Class IV and VI Landfill Permit Application Form

Part I General Information APPLICANT: PLEASE COMPLETE ALL SECTIONS.

I. Landfill Type	☐ Class IVa ☒ Class IVb ☐ Class VI	**II. Application Type**	☒ New Application ☐ Facility Expansion ☐ Renewal Application ☐ Modification

For Renewal Applications, Facility Expansion Applications and Modifications Enter Current Permit Number ______

III. Facility Name and Location

Legal Name of Facility: Weber County C&D Landfill				
Site Address (street or directions to site): 10485 West 900 South			County: Weber	
City: Ogden	State: Utah	Zip Code: 84404	Telephone:	
Township: 6 North	Range: 3 West	Section(s): 19	Quarter/Quarter Section:	Quarter Section: Northwest
Main Gate Latitude degrees 41 minutes 14 seconds 55.0		Longitude degrees 112 minutes 13 seconds 50.3		

IV. Facility Owner(s) Information

Legal Name of Facility Owner: Weber County Corp.			
Address (mailing): 867 West Wilson Lane			
City: Ogden	State: Utah	Zip Code: 84401	Telephone: (801) 399-8803

V. Facility Operator(s) Information

Legal Name of Facility Operator: Moulding & Sons Landfill, LLC			
Address (mailing): 910 West 21st Street			
City: Ogden	State: Utah	Zip Code: 84401	Telephone: (801) 725-2722

VI. Property Owner(s) Information

Legal Name of Property Owner: Weber County Corp.			
Address (mailing): 2380 S. Washington Blvd			
City: Ogden	State: Utah	Zip Code: 84401	Telephone: (801) 399-8416

VII. Contact Information

Owner Contact: Gary C. Laird		Title: Weber County - Director of Solid Waste	
Address (mailing): 867 West Wilson Lane			
City: Ogden	State: Utah	Zip Code: 84401	Telephone: (801) 399-8803
Email Address: glaird@co.weber.ut.us		Alternative Telephone (cell or other): (801) 399-8806	
Operator Contact: Randy Moulding		Title:	
Address (mailing): 910 West 21st Street			
City: Ogden	State: Utah	Zip Code: 84401	Telephone: (801) 725-2722
Email Address:		Alternative Telephone (cell or other):	
Property Owner Contact: Nate Pierce		Title: Weber County - Director of Operations	
Address (mailing): 444 24th Street			
City: Ogden	State: Utah	Zip Code: 84401	Telephone: (801) 625-3850
Email Address: npierce@co.weber.ut.us		Alternative Telephone (cell or other):	

Utah Class IV and VI Landfill Permit Application Form

Part I General Information (Continued)

VIII. Waste Types (check all that apply)	**IX. Facility Area**
☐ Landfill will accept all wastes allowed in Class IV or VI landfills **Or** landfill will accept only the following wastes	Facility Area: 110.7 acres
Waste Type / Combined Disposal Unit / Monofill Unit	Disposal Area: 98.5 acres
☐ Construction & Demolition ☐ ☐	Design Capacity
☐ Tires ☐ ☐	Years: 50 est.
☐ Yard Waste ☐ ☐	Cubic Yards: 16 Million
☐ Animals ☐ ☐	Tons: 8 Million
☐ Contaminated Soil ☐ ☐	
☒ Other All Class IVb Wastes ☒ ☐	
Note: Disposal of dead animals must be approved by the Executive Secretary	

X. Fee and Application Documents

Indicate Documents Attached To This Application ☐ Application Fee: Amount $

☒ Facility Map or Maps ☒ Facility Legal Description ☒ Plan of Operation ☒ Waste Description
☒ Ground Water Report ☒ Closure Design ☒ Cost Estimates ☒ Financial Assurance

Class VI Special Requirements

☐ Documents required by UCA 19-6-108(9) and (10)

I HEREBY CERTIFY THAT THIS INFORMATION AND ALL ATTACHED PAGES ARE CORRECT AND COMPLETE.

	Title	Date	Address
Signature of Authorized Owner Representative: [signature] Name typed or printed: Gary C. Laird	Weber County - Director of Solid Waste		867 West Wilson Lane, Ogden, Utah 84401
Signature of Authorized Land Owner Representative (if applicable): [signature] Name typed or printed: Gary C. Laird	Weber County - Director of Solid Waste		867 West Wilson Lane, Ogden, Utah 84401
Signature of Authorized Operator Representative (if applicable): [signature] Name typed or printed: Randy Moulding	Moulding & Sons Landfill, LLC - President		910 West 21st Street, Ogden, Utah 84401

SECTION III

PART II
UTAH CLASS IVb
PERMIT APPLICATION CHECKLIST

The following pages include the completed Utah Class IVb Permit Application Checklist as obtained from Utah Division of Solid and Hazardous Waste. The checklist includes reference to the locations in this permit application where each item required on the checklist is provided.

Utah Class IV and VI Landfill Permit Application Checklist

Important Note: The following checklist is for the permit application and addresses only the requirements of the Division of Solid and Hazardous Waste. Other federal, state, or local agencies may have requirements that the facility must meet. The applicant is responsible to be informed of, and meet, any applicable requirements. Examples of these requirements may include obtaining a conditional use permit, a business license, or a storm water permit. The applicant is reminded that obtaining a permit under the *Solid Waste Permitting and Management Rules* does not exempt the facility from these other requirements.

An application for a permit to construct and operate a landfill is the documentation that the landfill will be located, designed, constructed, and operated to meet the requirements of Rules R315-305 of the *Utah Solid Waste Permitting and Management Rules* and the *Utah Solid and Hazardous Waste Act* (UCA 19-6-101 through 123). The application should be written to be understandable by regulatory agencies, landfill operators, and the general public. The application should also be written so that the landfill operator, after reading it, will be able to operate the landfill according to the requirements with a minimum of additional training.

Copies of the *Solid Waste Permitting and Management Rules*, the *Utah Solid and Hazardous Waste Act*, along with many other useful guidance documents can be obtained by contacting the Division of Solid and Hazardous Waste at 801-538-6170. Most of these documents are available on the Division's web page at www.hazardouswaste.utah.gov. Guidance documents can be found at the solid waste section portion of the web page.

When the application is determined to be complete, the original complete application and one copy of the complete application are required along with an electronic copy.

Part II **Application Checklist**

***I.* Facility General Information**	
Description of Item	Location In Document
Ia. General Information - All Facilities	
Completed Part I General information form above	IV-1
General description of the facility (R315-310-3(1)(b))	IV-1
Legal description of property (R315-310-3(1)(c))	IV-2
Proof of ownership, lease agreement, or other mechanism (R315-310-3(1)(c))	IV-2
If the permit application is for a Class IV landfill, a demonstration that the landfill is not a commercial facility	IV-2
Waste type and anticipated daily volume (R315-310-3(1)(d))	IV-2
Intended schedule of construction (R315-302-2(2)(a))	IV-3
Ib. General Information - New Or Laterally Expanding Facilities	
Documentation that the Historical Survey requirements of R315-302-1(2)(f) have been met (R315-305-4(1)(b)(vi))	V-1
Name and address of all property owners within 1000 feet of the facility boundary (R315-310-3(2)(i))	V-1
Documentation that a notice of intent to apply for a permit has been sent to all property owners listed above (R315-310-3(2)(ii))	V-2

***I.* Facility General Information**	
Description of Item	Location In Document
Name of the local government with jurisdiction over the facility site (R315-310-3(2)(iii))	V-2
Ic. Location Standards - New Or Laterally Expanding Class IVa Landfills (R315-305-4(1)(a))	
Land use compatibility	Does Not Apply
Maps showing the existing land use, topography, residences, parks, monuments, recreation areas or wilderness areas within 1000 feet of the site boundary	Does Not Apply
Certifications that no ecologically or scientifically significant areas or endangered species are present in site area	Does Not Apply
Maps showing the location of dwellings, residential areas, other structures, and historic structures.	Does Not Apply
List of airports within five miles of facility and distance to each	Does Not Apply
Geology	Does Not Apply
Geologic maps showing significant geologic features, faults, and unstable areas	Does Not Apply
Maps showing site soils	Does Not Apply
Surface water	Does Not Apply
Magnitude of 24 hour 25 year and 100 year storm events	Does Not Apply
Average annual rainfall	Does Not Apply
Maximum elevation of flood waters proximate to the facility	Does Not Apply
Maximum elevation of flood water from 100 year flood for waters proximate to the facility	Does Not Apply
Wetlands	Does Not Apply
Ground water	Does Not Apply
Id. Location Standards - New Or Laterally Expanding Class IVb and VI Landfills	
Floodplains as specified in R315-302-1(2)(c)(ii) (R315-305-4(1)(b)(i))	VI-1
Wetlands as specified in R315-302-1(2)(d) (R315-305-4(1)(b)(ii))	VI-1
The landfill is located so that the lowest level of waste is at least ten feet above the historical high level of ground water (R315-305-4(1)(b)(iii))	VI-1
Geology as specified in R315-302-1(2)(b)(i) and (iv) (R315-305-4(1)(b)(iv))	VI-2
Ie. Additional Location Standards - New Or Laterally Expanding Class IVb and VI Landfills Or Landfills Requesting That Dead Animals Be Added As A New Waste Stream (R315-305-4(1)(a)(v))	
Maps showing the existing land use, topography, residences, parks, monuments, recreation areas or wilderness areas within 1000 feet of the site boundary	VII-1

***I.* Facility General Information**	
Description of Item	Location In Document
Certifications that no ecologically or scientifically significant areas or endangered species are present in site area	VII-1
Maps showing the location of dwellings, residential areas, other structures, and historic structures.	VII-1
List of airports within five miles of facility and distance to each	VII-1
If. Plan Of Operations - All Facilities (R315-310-3(1)(e) and R315-302-2(2))	
Description of on-site waste handling procedures and an example of the form that will be used to record the weights or volumes of waste received (R315-302-2(2)(b) And R315-310-3(1)(f))	VIII-1
Schedule for conducting inspections and monitoring, and examples of the forms that will be used to record the results of the inspections and monitoring (R315-302-2(2)(c), R315-302-2(5)(a), and R315-310-3(1)(g))	VIII-2
Contingency plans in the event of a fire or explosion (R315-302-2(2)(d))	VIII-2
Plan to control fugitive dust generated from roads, construction, general operations, and covering the waste (R315-302-2(2)(g))	VIII-3
Plan for letter control and collection (R315-302-2(2)(h))	VIII-3
Procedures for excluding the receipt of prohibited hazardous or PCB containing waste (R315-302-2(2)(j))	VIII-3
Procedures for controlling disease vectors (R315-302-2(2)(k))	VIII-4
A plan for alternative waste handling (R315-302-2(2)(l))	VIII-4
A general training and safety plan for site operations (R315-302-2(2)(o))	VIII-4
Any recycling programs planned at the facility (R315-303-4(6))	VIII-4
Any other site specific information pertaining to the plan of operation required by the Executive Secretary (R315-302-2(2)(o))	VIII-5
Ig. Additional Plan Of Operation Requirements - Class IVa Facilities	
Corrective action programs to be initiated if ground water is contaminated (R315-302-2(2)(e))	*Does Not Apply*
***II* Facility Technical Information**	
IIa. Maps - All Facilities	
Topographic map drawn to the required scale with contours showing the boundaries of the landfill unit, ground water monitoring well locations, gas monitoring points, and the borrow and fill areas (R315-310-4(2)(a)(i))	IX-1 and FIGURES
Most recent U.S. Geological Survey topographic map, 7-1/2 minute series, showing the waste facility boundary; the property boundary; surface drainage channels; any existing utilities and structures within one-fourth mile of the site; and the direction of the prevailing winds (R315-310-4(2)(a)(ii))	IX-1 and FIGURES

I. **Facility General Information**	
Description of Item	Location In Document
IIb. Geohydrological Assessment - Class IVa Landfills (R315-310-4(2)(b))	
Local and regional geology and hydrology including faults, unstable slopes and subsidence areas on site (R315-310-4(2)(b)(i))	Does Not Apply
Evaluation of bedrock and soil types and properties including permeability rates (R315-310-4(2)(b)(ii))	Does Not Apply
Depth to ground water (R315-310-4(2)(b)(iii))	Does Not Apply
Quantity, location, and construction of any private or public wells on-site or within 2,000 feet of the facility boundary (R315-310-4(2)(b)(v))	Does Not Apply
Tabulation of all water rights for ground water and surface water on-site and within 2,000 feet of the facility boundary (R315-310-4(2)(b)(vi))	Does Not Apply
Identification and description of all surface waters on-site and within one mile of the facility boundary (R315-310-4(2)(b)(vii))	Does Not Apply
For an existing facility, identification of impacts upon the ground water and surface water from leachate discharges (R315-310-4(2)(b)(viii))	Does Not Apply
Calculation of site water balance (R315-310-4(2)(b)(ix))	Does Not Apply
IIc. Engineering Report, Plans, Specifications, And Calculations - All Facilities	
Unit design to include cover design; fill methods; and elevation of final cover including plans and drawings signed and sealed by a professional engineer registered in the State of Utah, when required (R315-310-3(1)(b) and R315-310-4(2)(c)(iii))	X-1
Design and location of run-on and run-off control systems (R315-310-4(2)(c)(viii))	X-2
Anticipated facility life and the basis for calculating the facility's life (R315-310-4(2)(c)(ii))	X-2
Engineering reports required to meet the location standards of R315-305-4 including documentation of any demonstration or exemption made for any location standard (R315-310-4(2)(c)(i))	X-3
Identification of borrow sources for final cover (R315-310-4(2)(c)(iv))	X-3
Run-off collection, treatment, and disposal and documentation to show that any treatment system is being or has been reviewed by the Division of Water Quality (R315-310-4(2)(c)(v) and R315-310-3(1)(i))	X-3
IId. Closure Requirements - All Facilities	
CLOSURE PLAN (R315-310-3(1)(h))	XI-1
Closure schedule (R315-310-4(2)(d)(i))	XI-1
Design of final cover (R315-310-4(2)(c)(iii))	XI-1

I. **Facility General Information**	
Description of Item	Location In Document
Capacity of site in volume and tonnage (R315-310-4(2)(d)(ii))	XI-1
Final inspection by regulatory agencies (R315-310-4(2)(d)(iii))	XI-1
IIe. Post-Closure Requirements- All Facilities	
POST-CLOSURE CARE PLAN (R315-310-3(1)(h))	XII-1
Changes to record of title, land use, and zoning restrictions (R315-310-4(2)(e)(ii))	XII-1
Maintenance activities to maintain cover and run-on/run-off control systems (R315-310-4(2)(e)(iii))	XII-1
List the name, address, and telephone number of the person or office to contact about the facility during the post-closure care period (R315-310-4(2)(e)(vi))	XII-1
IIf. Financial Assurance - All Facilities (R315-310-3(1)(j))	
Identification of closure costs including cost calculations (R315-310-4(2)(d)(iv))	XIII-1
Identification of post-closure care costs including cost calculations (R315-310-4(2)(e)(iv))	XIII-2
Identification of the financial assurance mechanism that meets the requirements of Rule R315-309 and the date that the mechanism will become effective (R315-309-1(1))	XIII-2

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SECTION IV

PART II
I. FACILITY GENERAL INFORMATION

Ia. GENERAL INFORMATION - ALL FACILITIES

Completed Part I General Information Form

The part I general information form is completed and is provided in Section I of this document.

General description of the Facility (R315-310-3(1)(b))

The Weber County C & D Landfill will be located on approximately 110.7 acres of land located in the Northwest Quarter of Section 19, Township 6 North, Range 3 West, Salt Lake Base and Meridian. Property owners surrounding the proposed landfill site include the U. S. Government (Air Force property) to the west, the Union Pacific Railroad and undeveloped land owned by Powder Mountain Group Holding LLC to the south, Bible Broadcasting Network, Inc. (on which a radio tower has been constructed) and undeveloped property owned by Joseph M. Colosimo to the north, and undeveloped property owned by Counterpoint Construction Company to the east. The property is located along base of the south side of Little Mountain located in Weber County. Sheet C-1 of the design drawings shows the general location of the site (Exhibit A,, Appendix 1).

Weber County land use zoning for the site and of the properties adjacent to the proposed landfill are designated as M-3 (heavy manufacturing). Since this will be a non-commercial landfill owned by Weber County, no zoning changes or conditional use permits will be required by Weber County. The landfill site will be surrounded by a minimum 4-foot high security fence consisting of either a 5-strand barbed wire fence or a wire-mesh field fence. The fence will be either constructed in phases as landfill expansion occurs or may be constructed around the entire facility property at any time during the facility life.

Site access will be from an existing asphalt road (900 South) located along the north side of the property with the entrance approximately 500 feet west of the east property line. Weber County has assigned the street address of the facility as 10485 West 900 South. A 6-foot high chain link fence will extend for minimum distance of 50 feet on each side of the site entrance with a gate that can be closed and locked during hours the landfill is not open. Access to the facility will be gated to inhibit unauthorized entrance when the landfill operator is not present.

The landfill footprint will consist approximately 98.5 acres and the rest of the property will include storm drainage and operational facilities, and site access roads. The waste pile is designed to be approximately 180 to 200 feet heigh around the perimeter slopes and approaches 230 feet in height along the center ridge line.

Benches are provided approximately every 50 feet of vertical height around the perimeter slopes to accommodate storm water management and structural stability. The benches are approximately 18 feet wide and provide a ditch depth of approximately 3 feet. All benches provide a drainage slope toward the southeast corner of the waste pile where storm drainage inlet boxes and down drain piping will be installed to convey storm water off the landfill area. Bench widths also provide access around the perimeter slopes for periodic inspection and maintenance.

Three storm water management ponds are included in the design to provide storm water detention and to provide for water quality controls prior to discharging storm water off site. The operations pond will collect storm water from the operations area and discharge the water into the upper east pond. The upper east pond receives storm water from the operations pond, from the areas of Little Mountain and the asphalt road up-gradient from the facility, and from part of the lower east and north slope areas of the landfill, The southeast pond receives storm water from the upper east pond and from the remaining landfill area. Discharge from the southeast pond will be off-site directly in line with a culvert that has been installed to direct storm water under the railroad and to the mud flats on the south side of the railroad. Each detention pond is equipped with an outlet design that provides for skimming of oils and other materials that will collect on the surface of the water in the ponds.

Legal description of property (R315-310-3(1)(c))

The legal description of the property as provided on the Quit-Claim Deed for Moulding Investments, LLC and in a property purchase and landfill operating agreement between Moulding Investments, LLC and Weber County located in Exhibit B.

Proof of ownership, lease agreement, or other mechanism (R315-310-3(1)(c))

The proof of ownership is provided in the form of a Quit-Claim Deed for Moulding Investments, LLC and in a property purchase and landfill operating agreement between Moulding Investments, LLC and Weber County which are all provided in Exhibit B. The landfill will be owned and under the control of Weber County and operated by Moulding & Sons Landfill, LLC under contract with Weber County.

If the permit application is for a Class IV landfill, a demonstration that the landfill is not a *commercial facility*

It is anticipated that the landfill will receive construction and demolition wastes from within Weber County. *The contracts for ownership and operation of the facility are provided in Exhibit B as* described in the previous section. Weber County ownership and control over the landfill operations activities and the operating agreement between Weber County and Moulding Investments, LLC provide demonstration of the non-commercial nature of the facility.

Waste type and anticipated daily volume (R315-310-3(1)(d))

The facility will be a Class IVb construction and demolition landfill used for disposal of **non-hazardous wastes** as defined by R315-305-1 **and in accordance with the following waste types:**

- Construction/demolition waste;
- Yard waste;
- Inert waste;
- Dead animals upon, as approved by the Executive Secretary and upon meeting the requirements of R315-315-6 which provide for disposal, burial and cover requirements for dead animals;
- Non-hazardous petroleum contaminated soils containing the following constituents below the following levels:

    - Benzene, 0.03 mg/kg;
    - Ethylbenzene, 13 mg/kg;
    - Toluene, 12 mg/kg; and
    - Zylenes, 200 mg/kg

- No wastes wastes will be accepted from a conditionally exempt small quantity generator of hazardous waste will be accepted.

Anticipated daily volumes will include approximately 600 to 1000 tons per day depending on the time of year and the economic environment for construction and demolition projects.

Intended schedule of construction (R315-302-2(2)(a))

Construction is anticipated to begin in early 2009 or immediately following issuance of the required permits from the Utah Division of Solid and Hazardous Waste and Weber County Planning and Zoning. Initial construction will include the access road, installation of a mobile office for checking in waste deliveries and keeping records, preparing the floor grades in the initial landfill operating area to provide sufficient air space to begin receipt of waste, and installation of utilities needed for the mobile office and for construction and dust control water.

Construction of the floor area will expand as needed to provide air space to meet operational needs as waste is received during the life of the facility. Only earthwork construction will be required to provide the needed cuts and fills to achieve a level that is at or above the floor design grades provided in the drawings. In areas where fill is required to obtain design floor elevations, inert imported fill in the form of concrete, masonry, imported soils, etc. may be used in lieu of on-site soils for fill.

SECTION V

PART II
I. FACILITY GENERAL INFORMATION

Ib. GENERAL INFORMATION - NEW OR LATERALLY EXPANDING FACILITIES

Documentation that Historical Survey requirements of R315-302-1(2)(f) have been met (R315-305-4(1)(b)(vi))

A historical survey was completed by Sagebrush Consultants in June 2008. The report providing the results of the survey was submitted to the State Historic Preservation Officer in July 2008 and is provided Exhibit C of this permit application. According to the report submitted, there were two sites identified. The report summarizes that "the inventory resulted in the identification of one historic campsite, 42WB445, and one rock quarry, 42WB446. Due to their proximity to the Lucin Cutoff, as well as datable artifacts found at the campsite, it is highly likely that these two sites are related to the construction of the cutoff... Both sites were recommended eligible to the National Register of Historic Places due to their association with the significant historic site, the Lucin Cutoff."

The historic campsite, which is within the existing 100-foot road right-of-way will be preserved since it is off the landfill facility property, however, the rock quarry area will be incorporated into the active landfill area.

Name and address of all property owners within 1000 feet of the facility boundary (R315-310-3(2)(l))

Colosimo, Joseph M
P.O. Box 1178
Draper, Utah 84020

Bible Broadcasting Network, Inc.
11530 Carmel Commons Blvd.
Charlotte, North Carolina 28226

United States of America
Hill Air Force Base
Tim Stone, AICP
Hill Air Force Base Community Planner
75 CEG/CEPP
7302 Wardleigh Road
Hill AFB, Utah 84056-5016

State of Utah
Division of Wildlife Resources
Attn: Scott Walker - Habitat Manager
515 East 5300 South
Ogden, Utah 84405

Powder Mountain Group Holdings LLC
57 W 200 S
Salt Lake City, Utah 84111

Union Pacific Railroad
1400 Douglas Street
Omaha, Nebraska 68179

Westinghouse Electric Company LLC
1330 Beulah Road
Pittsburgh, Pennsylvania 15235

Counterpoint Construction Company, Inc.
1598 North 352 West
Layton, Utah 84040

Utah Department of Transportation
4501 South 2700 West
Mail Stop 141200
Salt Lake City, Utah 84114-1200

Documentation that a notice of intent to apply for a permit has been sent to all property owners listed above (R315-310-3(2)(ii))

Copies of all letters provided to the surrounding property owners are included in Exhibit D.

Name of the local government with jurisdiction over the facility site (R315-310-3(2)(iii))

Local government with jurisdiction over the facility is:

Weber County
2380 Washington Blvd.
Ogden, Utah 84401

SECTION VI

PART II
I. FACILITY GENERAL INFORMATION

Id. LOCATION STANDARDS - NEW OR LATERALLY EXPANDING CLASS IVb AND VI LANDFILLS (R315-305-4(1)(a))

Floodplains as specified in R315-302-1(2)(c)(ii) (R315-305-4(1)(b)(i))

Flood mapping showing the 100-year flood area in the proximity of the facility, as obtained from the Federal Emergency Management Agency (FEMA), is found in Exhibit E.

According to the Federal Emergency Management Agency (FEMA) flood plain map for the area (Flood Insurance Rate Map Weber County, Utah and Incorporated Areas, Panel 400 of 600, Map Number 49057C0400E, Effective Date December 16, 2005), the subject property is not within the designated 100-year flood plain. The recorded historic high elevation (records dating back to 1850) of the Great Salt Lake (GSL) is 4211.6 which occurred in 1986 and 1987 according the the U.S. Geological Survey (USGS). The low point on the landfill floor is 4215, which is 3.4 feet above the historic level of the GSL and the same elevation at which the lake spills into the west dessert (significantly increasing the area of the lake) according to the USGS. The raised Union Pacific railroad tracks immediately to the south provides a barrier between the GSL and the facility that prevents wave action from impacting the facility.

The west dessert pumping project (completed and operational in the spring of 1987) was designed and constructed to reduce GSL levels by removing water from the lake and diverting the water to the west dessert. This process increased the surface area of the lake water resulting in greater evaporation and reducing GSL levels. The pumps operated for approximately two years and effectively lowered the level of the GSL by approximately two feet during that time. According to the Utah Division of Water Resources, the elevation at which the pumps could begin operation, and the elevation that would trigger action to obtain the necessary permits and renewal of the environmental impact statement to begin pump operation, is 4208 (which is also the elevation restriction by the U.S. Air Force permit). Since 1987 the GSL has declined in elevation to the current elevation of just below 4196 which is near the historic low of 4191.35 (occurring in 1963). Salt Lake City's wastewater treatment plant has an effluent high water operating elevation of 4215.02 and there are other facilities around the GSL that will be greatly impacted at or near this elevation. Therefore, the State of Utah will most likely begin operating the pumping plant when, and if, GSL levels again approach the elevations of these facilities. Additionally, with the construction of Jordanelle reservoir (after the high level of GSL in 1986 and 1987), development of additional ground water resources, and future development of storage associated with storage rights on the Bear River, potential flow into the GSL from ground and surface water sources has been and will continue to be reduced.

The average annual rainfall for the site is approximately 13.2 inches based on the Utah Climate Center climate summary table for the Bear River Bay, Utah weather station.

Magnitudes of the 100-year 24-hour and the 25-year 24-hour precipitation events at the facility are 2.73 and 2.23 inches, respectively based on the Point Precipitation Frequency Estimates from NOAA Atlas 14 (Exhibit A, Appendix 4).

Wetlands as specified in R315-302-1(2)(d) (R315-305-4(1)(b)(ii))

A search was competed on the national wetlands inventory web site (www.fws.gov/nwi/) and several potential wetlands were presented at the site. A wetlands biologist, certified by the Bountiful Army Corps of Engineers (COE) and a wetlands specialist from the COE Bountiful office a site visit on September 12, 2008. According to the COE wetland specialist, and based on criteria defined in a memorandum from the EPA and the Army Corps of Engineers entitled "Clean Water Act Jurisdiction Following the U.S. Supreme Court's Decision in Rapanos v. United States & Carabell v. United States" dated June 2007, the determination for all wetlands located on the proposed landfill site is non-jurisdictional. Based on conversations with COE personnel, documentation has been prepared from the COE Bountiful office classifying all wetlands at the proposed site as non-jurisdictional. This documentation is to be included as Exhibit E.

The landfill is located so that the lowest level of waste is at least ten feet above the historical high level of ground water (R315-305-4(1)(b)(iii))

The Owner requests a variance by the Executive Secretary to allow five feet of separation in lieu of the ten-foot separation requirement. This request is based on the poor quality of ground water in the uppermost aquifer, the inert nature of the waste materials that will be received, and the low permeability associated with the soils at the site.

Two ground water samples were obtained from soil boring locations (B-4 and B-7) near the south, or down-gradient, side of the property. Water quality analyses were completed on the two samples obtained by American West Analytical Laboratories. Results of the laboratory analyses show TDS values of 29,000 mg/L and 23,000 mg/L in the samples obtained from B-4 and B-7, respectively (Exhibit A, Appendix 3). Ground waters with TDS values over 10,000 mg/L are defined by the Utah Division of Water Quality as Class IV or Saline Ground Water.

Laboratory permeability analyses were conducted on samples consisting of lean clay and the interlayered clay and silt materials obtained at a depth of about 0.5 foot in TP-1 and at a depth of about 2.5 feet in TP-7. Results show the permeability of the lean clay to be 2×10^{-6} cm/sec and the permeability of the interlayered clay and silt to be 2×10^{-7} cm/sec (Exhibit A, Appendix 2, Page 5).

Geology as specified in R315-302-1(2)(b)(I) and (iv) (R315-305-4(1)(b)(iv))

The site is not located in a dam failure flood area, or above an underground mine, a salt dome, or a salt bed, and is not located adjacent to features which could compromise the structural integrity of the facility. There are also no local soil conditions, geolotic features, or human made features that will compromise the integrity of the structural components of the facility.

A letter from Applied Geotechnical Engineering Consultants (AGEC), dated December 4, 2008 (Exhibit A, Appendix 2) provides a description of the regional and site geology, the tectonic setting, and geologic hazards. Much of the text herein is directly from the AGEC letter.

Regional Geology includes the Basin and Range physiographic province at the northeast end of the Great Salt Lake which is made up of north/south elongated mountain blocks and valleys. The area in and around the Great Salt lake was once occupied by a large lake known as Lake Bonneville during the Wisconsin Glacial Period of the Pleistocene Age. The present-day Great Salt Lake is a remnant of ancient Lake Bonneville. The stillstands of Lake Bonneville formed benches along the Wasatch Front. The highest level of Lake Bonneville is marked by a bench, the Bonneville shoreline, at approximate elevation 5200 feet. The lake remained at this high level from approximately 17,000 to 15,0000 years before the present until it dropped approximately 350 feet6 during a catastrophic flood known as the Bonneville Flood. Two lower stillstands of Lake Bonneville are the Provo and Gilbert, which formed at approximate elevations of 4800 and 4250 feet, respectively. The lake has remained near its present-day level through most of Holocene time. The elevation of the site is just above the historic high level of the Great Salt Lake.

Site geology is associated withy the southnern end of Little Mountain which is a hill of exposed bedrock. This bedrock was mapped as consisting of rock from the Perry Canyon Formation. This bedrock is exposed along the north and west edges of the property and consists of diamictite and slate. The diamictite in this area generally dips down toward the northwest at approximately 7 to 10 degrees. Based on results of the subsurface investigation, there is a significant amount of sand and clay which overlies the bedrock in most of the area planned for landfilling. These soils consist of Lake Bonneville sediments which area interpreted to be both deep lake and near shore deposits.

Tectonic setting of the site is near the eastern side of the Basin and Range physiographic province adjacent to the Wasatch mountains. The Wasatch mountains are bounded on the west by the Wasatch fault zone which extends approximately 240 miles from near Malad, Idaho to the vicinity of Fayette, Utah. Relatively recent fault movements of the Wasatch fault zone are evidenced by offsets in Lake Bonneville sediments and more recent alluvial and colluvial deposits.

The Wasatch fault zone is considered to be made up of several segments, each segment acting relatively independently. The site is located approximately 14 miles west of the Weber segment of the Wasatch fault zone. There is another potentially active fault in the East Great Salt Lake fault, which extends along the west side of Antelope Island and Promontory Point. This fault is located approximately 11 miles to the southwest. This is the closest known potentially active fault to the site. Both of these faults show evidence of movement during the Holocent time and, thus, are considered potentially active. The Weber segment of the Wasatch fault zone is considered to potentially produce earthquakes as great as 7.2 moment magnitude and the east Great Salt Lake fault is considered to be able to produce a 6.9 moment magnitude earthquake.

Geologic Hazards identified during the study which may affect the site are primarily limited strong earthquake ground shaking and the potential for liquefaction and possibly lateral spread. Surface fault rupture, rockfall, landslide and debris flow are not considered potential hazards at the site.

SECTION VII

PART II

I. FACILITY GENERAL INFORMATION

Ie. ADDITIONAL LOCATION STANDARDS - NEW OR LATERALLY EXPANDING CLASS IVb AND VI LANDFILLS OR LANDFILLS REQUESTING THAT DEAD ANIMALS BE ADDED AS A NEW WASTE STREAM (R315-305-4(1)(A)(v))

Maps showing the existing land use, topography, residences, parks, monuments, recreation areas or wilderness areas within 1000 feet of the site boundary

Maps showing the existing land use, topography, residences, parks, monuments, recreation areas or wilderness areas within 1000 feet of the site boundary are provided in the figures. There are no existing residences, parks, monuments, recreation areas or wilderness areas within 1000 feet of the site boundary.

Certifications that no ecologically or scientifically significant areas or endangered species are present in the site area

A letter received from the State of Utah Department of Natural Resources, Division of Wildlife Resources dated October 16, 2008 states that "The Utah Division of Wildlife Resources (UDWR) does not have records of occurrence for any threatened, endangered, or sensitive species within the project area ... or within a 1-mile radius." The letter provided by the UDWR is included in Exhibit F.

Maps showing the location of dwellings, residential areas, other structures, and historic structures

Maps showing the location of dwellings, residential areas, other structures, and historic structures are found in an attached figure.

List of airports within five miles of facility and distance to each

There are no airports located within 5 miles of the facility as shown in the attached figures.

SECTION VIII

PART II
I. FACILITY GENERAL INFORMATION

If. PLAN OF OPERATIONS - ALL FACILITIES
(R315-310-3(1)(e) AND R315-302-2(2))

Description of On-Site Waste Handling procedures and an example of the form that will be used to record the weights or volumes of waste received (R315-302-2(2)(b) and R315-310-3(1)(f))

The landfill will be operated and managed by Moulding & Sons Landfill, LLC (Moulding & Sons) under contract with Weber County (Landfill Owner). Moulding & Sons will be responsible to Weber County to operate and manage the landfill under the requirements and conditions of the landfill permits.

Construction to expand the landfill area will occur as needed during the life of the landfill. Documentation will be provided to the Utah Division of Solid and Hazardous Waste (DSHW) to demonstrate that the floor grades achieved are at or above the design grades presented in the drawings. Disposal of non-inert waste materials (other than concrete, masonry, fill soils, etc.) in the newly constructed areas will only occur after approval to operate each completed area is provided by the Utah Division of Solid and Hazardous Waste. It is expected that general site grading for the landfill expansion will be ongoing to meet soil cover operational needs.

Handling procedures for C & D Waste will include checking in each truck load of waste material delivered to the landfill facility and either providing an estimated volume delivered with each load for conversion to tons received or by installation of scales and weighing each load of waste delivered. The conversion factor to be used will be 0.50 tons per cubic yards in accordance with R315-302-2(4)(c)(ii). Daily waste delivery records will be kept on a form similar to or containing similar information to the form contained in Exhibit G.

Trucks delivering inert waste consisting of concrete, masonry, non-contaminated soils, etc. will then be directed to either a location outside the landfill operational footprint for use as floor fill or operational cover materials, or to location at or near the working waste disposal face. Equipment operators will then place the inert waste materials as floor fill, in stockpiles to be used later as fill or cover materials, or as cover materials as needed for litter and vector control. Slightly contaminated soils meeting the requirements established for Class IVb wastes may be stockpiled in approved operational areas within the landfill footprint and used as waste cover materials.

Trucks delivering non-inert waste materials that can-not be used as clean fill or operational covers will be directed to the landfill waste pile working face. Equipment operators will then incorporate the waste materials into the working face or waste pile.

Dead Animals delivered to the site wil be managed and disposed in a manner that will minimize odors and the attraction, harborage, and propagation of insects, rodents, birds, or other animals. Dead animals will be disposed of: 1) At base of the active working face and buried immediately with a minimum of two feet of other waste; 2) In a separate trench specifically designated to receive dead animals and covered with at least 6 inches of earth at the end of the working day the carcasses are received. Disposal at the base of the active working face and covering the carcasses with at least 2 feet of waste is the preferred method of disposal. Trenches in which carcasses are disposed shall receive a minimum intermediate soil cover of 12 inches if delivery of additional carcasses is expected to exceed 30 days.

A 6-inch thick soil cover will be placed over wastes as required for litter and vector control, and to reduce the potential of fire hazard. A final 2-foot thick final cover will be placed above areas of the waste mound as final grades are obtained.

Schedule for conducting inspections and monitoring, and examples of the forms that will be used to record the results of the inspections and monitoring (R315-302-2(2)(c), R315-302-2(5)(a), and R315-310-3(1)(g))

The schedule of inspections and monitoring associated with the landfill facility to provide for proper operation and maintenance are provided in Table VIII-1.

TABLE VIII-1
INSPECTION SCHEDULE

Inspection Activity	Frequency
Access Road and Gate	Quarterly
Security Fences	Quarterly
Landfill Construction	At the time of each construction phase
Landfill Equipment	As recommended by Manufacturers
Storm Drainage Facilities	Quarterly
Final Closure Cover	Semi-Annual
Post Closure	Semi-Annual

Contingency plans in the event of a fire or explosion (R315-302-2(2)(d))

Fire hazard is reduced by soil cover materials placed on ignitable waste during waste handling and placement. In the event that fires do occur during operating hours, the burning material will first be covered with on-site or other available soil material. Small fires may be extinguished with fire extinguishers provided in the site vehicles, by using on-site water available from designated water sources, and/or by covering the fires with on-site or other available soils.

Upon notification of a fire that can not be controlled using on-site equipment, a long blase (greater than 30 seconds) on a vehicle horn or on permanent site alarm equipment will be sounded and non-essential equipment will be shut down. All site personnel will assemble outside the landfill entrance and the Weber Fire District will be notified. All site personnel will be moved a safe distance from the area involved until the fire is safely controlled or extinguished. The telephone number and location of the nearest fire station will be displayed near telephones located in the site office.

Fires that occur during times that the landfill is closed will have additional time to spread and will, therefore, be more difficult to contain and control. The landfill operator or manager may utilize site equipment to cover fires with soil and/or separate burning materials from the other waste materials and bury the burning materials with soil. Otherwise, the local fire department will be notified to assist in the efforts to control fires.

Explosive gases are expected to be minimal due to the type of waste received (mostly being relatively inert), the dry nature of the waste entering the landfill, and the dry climate and limited availability of moisture that can leach into the landfilled waste.

Plan to control fugitive dust generated from roads, construction, general operations, and covering the waste (R315-302-2(2)(g))

Fugitive dust will be controlled by applying water, or by use of other dust treatment and control procedures, to roads and other exposed surfaces where fugitive dust generation becomes a nuisance. Fugitive dust and the control of fugitive dust will be routinely reviewed for compliance with Division of Air Quality regulations.

Plan for litter control and collection (R315-302-2(2)(h))

Litter will be controlled by fencing and using soil cover as needed. Although measures intended to control litter dispersal are effective, it is inevitable that litter collection will still be required. There will be periods of time when wind conditions are very calm and litter will not be problematic. However, there will be occasions when winds will occur that will most likely scatter some litter around the property and onto surrounding properties. When litter collection is necessary, the facility will hire laborers to pick up scattered litter around the facility and surrounding properties.

Procedures for excluding the receipt of prohibited hazardous or PCB containing waste (R315-302-2(2)(j))

The landfill will be operated as a non-hazardous solid waste facility and will accept only waste defined in for Class IVb landfill disposal. Landfill operators and waste handling personnel will also be trained in identification and removal of hazardous and PCB containing wastes. If hazardous and PCB containing wastes are observed during delivery or disposal, these materials will be removed and, sent back with the vehicle delivering the waste, or arrangements will be made for their proper handling and disposal. The landfill manager will have ultimate authority and responsibility for decisions regarding acceptance or rejection of waste materials.

Procedures for controlling disease vectors (R315-302-2(2)(k))

Six inches of soil thickness will be placed over wastes materials that may attract vectors. Waste materials expected to attract vectors primarily include wet or green wastes, including yard wastes.

A plan for alternative waste handling (R315-302-2(2)(l))

In the event of an emergency, areas of the facility other than the active disposal areas may be used to receive waste (for disposal or temporary storage), but only if such areas are available. If no such areas are available during an emergency, waste receipt will be temporarily halted until such areas can be made available for disposal or storage and waste in transit will be directed elsewhere.

***A general training and safety plan for site operations* (R315-302-2(2)(o))**

Employee health and safety, and maintaining environmental quality are important to Weber County and to Moulding & Sons in the operation of the facility. Each person employed at the landfill will be trained to have a working knowledge of basic health, safety, and emergency response procedures for the facility. Those employed to handle waste materials will be trained with basic maintenance and operational procedures to avoid endangerment of human health and safety, and to protect the quality of the environmental. Those employed to operate equipment will receive training for the proper operation, care, and maintenance of the equipment to which they are assigned.

A facility training program will be implement through on-the-job supervision and training and through formal classroom training, as needed, by individuals qualified to provide the training. The facility training program will be directed by the facility manager, or a designated trainer. Initial training will be completed within the first two months of employment followed by annual reviews and by regular and special training meetings scheduled as needed.

Any recycling programs planned at the facility (R315-303-4(6))

Delivery of waste will primarily be from demolition and building contractors and is expected to have only limited use by the general public. General contractors will be encouraged to segregate recyclable materials at the job site and deliver the recyclable materials to individual recycling entities. The general public will be encouraged to deliver waste materials to the Weber County transfer station where re-cycling options are currently in place. Weber County also currently operates a recycling program for green and wood type wastes.

An area may be provided at the landfill facility immediately east of the operations area where recycling of wood or other wastes may occur. There are several entities in Weber County that provide recycling services for non-reinforced concrete materials. It is expected that recyclable concrete materials will be delivered to those entities.

Any other site specific information pertaining to the plan of operation required by the Executive Secretary (R315-302-2(2)(o))

The Executive Secretary may issue by permit additional site specific requirements that will become a part of the facility operating plan.

SECTION IX

PART II

II. FACILITY TECHNICAL INFORMATION

IIa. MAPS - ALL FACILITIES

Topographic map drawn to the required scale with contours showing the boundaries of the landfill unit, ground water monitoring well locations, gas monitoring points, and the borrow and fill areas (R315-310-4(2)(a)(i))

Topographic mapping is provided with the figures and as Sheet GW-1 in Exhibit A, Appendix 1, Sheet GW-1 also provided ground water surface contours as generated from ground water measurements.

Ground water monitoring is not anticipated due to the types of wastes that will be delivered to the landfill and the poor quality of ground water below the site.

Landfill gas monitoring is not anticipated due to the types mostly inert nature of waste materials that will be delivered to the landfill.

Borrow and fill areas are presented in Sheet C-2 in Exhibit A, Appendix 1. This sheet presents existing and future contours associated with the floor grade of the landfill. It is expected that all fill materials will be obtained either on-site from cut areas presented to achieve design floor grades or from delivery of inert waste and soil materials. Some borrowing of materials may also occur as needed from off-site sources or properties owned by Weber County.

Most recent U.S. Geological Survey topographic map, 7-1/2 minute series, showing the waste facility boundary; the property boundary; surface drainage channels; any existing utilities and structures within one-fourth mile of the site; and the direction fo the prevailing winds (R315-310-4(2)(a)(ii)

The U.S. Geological Survey topographic map is provided with the figures. This map shows the direction of the prevailing winds which are from the south direction.

SECTION X

PART II
II. FACILITY TECHNICAL INFORMATION

IIc. ENGINEERING REPORT - PLANS, SPECIFICATIONS, AND CALCULATIONS - ALL FACILITIES

The complete engineering report including design drawings, a geotechnical and geological evaluation report, and supporting design calculations, is included in Exhibit A. The following provides responses to specific items contained on the Application Checklist.

Unit design to include cover design; fill methods; and elevation of final cover including plans and drawings signed and sealed by a professional engineer registered in the State of Utah, when required (R315-310-3(1)(b) and R315-310-4(2)(c)(iii))

The Weber County C & D Landfill will be located on approximately 110.7 acres of land located in the Northwest Quarter of Section 19, Township 6 North, Range 3 West, Salt Lake Base and Meridian. Property owners surrounding the proposed landfill site include the U. S. Government (Air Force property) to the west, the Union Pacific Railroad and undeveloped land owned by Powder Mountain Group Holding LLC to the south, Bible Broadcasting Network, Inc. (on which a radio tower has been constructed) and undeveloped property owned by Joseph M. Colosimo to the north, and undeveloped property owned by Counterpoint Construction Company to the east. The property is located along base of the south side of Little Mountain located in Weber County. Figure 1 shows the general location of the site.

Weber County land use zoning for the site and of the properties adjacent to the proposed landfill are designated as M-3 (heavy manufacturing). Since this will be a non-commercial landfill owned by Weber County, no zoning changes are required. The landfill site will be surrounded by a minimum 4-foot high security fence consisting of either a 5-strand barbed wire fence or a wire-mesh field fence. The fence will be either constructed in phases as landfill expansion occurs or may be constructed around the entire facility property at any time during the facility life.

Site access will be from an existing asphalt road located along the north side of the property and approximately 500 feet west of the east property line. Weber County has assigned the street address of the facility as 10485 West 900 South. A 6-foot high chain link fence will extend for 50 feet on each side of the site entrance with a locking security gate at the facility entrance. Access to the facility will be gated to inhibit unauthorized entrance when the landfill operator is not present.

The landfill footprint will consist approximately 98.5 acres and the rest of the property will include storm drainage and operational facilities, and site access roads. The waste pile is designed to be approximately 180 to 200 feet heigh around the perimeter slopes and approaches 230 feet in height along the center ridge line.

Benches are provided approximately every 50 feet of vertical height around the perimeter slopes to accommodate storm water management and structural stability. The benches are approximately 18 feet wide and provide a ditch depth of approximately 3 feet. All benches slope toward the southeast corner of the waste pile where storm drainage inlet boxes and down drain piping will be installed to convey storm water off the landfill area. Bench widths also provide access around the perimeter slopes for periodic inspection and maintenance.

Three storm water management ponds are included in the design to provide storm water detention and to provide for water quality controls prior to discharging storm water off site. The operations pond will collect storm water from the operations area and discharge the water into the upper east pond. The upper east pond receives storm water from the operations pond, from the areas of Little Mountain, the asphalt road along the north side of the facility, and from part of the lower east and north slope areas of the landfill, The southeast pond receives storm water from the upper east pond and from the remaining landfill area. Discharge from the southeast pond will be off-site directly in line with a culvert that has been installed to direct storm water under the railroad and to the mud flats on the south side of the railroad. Each detention pond is equipped with an outlet design that provides for skimming of oils and other materials that may collect on the surface of the water in the ponds.

Design and location of run-on and run-off control systems (R315-310-4(2)(c)(viii))

Run-on Control System design includes control and proper conveyance of storm water that may enter the facility from up-gradient lands. Run-on is expected primarily from Little Mountain and the asphalt road north of the proposed facility. The run-on control system is designed to control storm water flows from a 100-year 24-hour storm event, which exceeds the regulatory requirements of designing the systems based on the 25-year event, and to route the storm water around the active landfill area.

Storm water from Little Mountain currently collects in a ditch system located on the north side of the asphalt road north of the proposed facility. The ditch system north of the facility conveys the storm water to three culverts that currently discharge storm water toward the facility property. A ditch will be constructed within the road right-of-way along the north side of the property to convey storm water discharged from the culverts toward the east and down the east side of the facility to the upper east detention pond. The storm water design drawings, calculations and supporting information are found in Exhibit A.

Run-off Control Systems include: 1) Control and containment of potentially contaminated storm water from active and open areas of the landfill where storm water may come in direct contact with waste material; and 2) Control and discharge of clean storm water that is generated from areas of the waste mound covered with clean soil and final cover soils.

Anticipated facility life and the basis for calculating the facility's life (R315-310-4(2)(c)(ii))

Anticipated facility life is approximately 50 years based on a total air space of 16 million cubic yards, approximately 1.6 million cubic yards of cover soil which reduces the waste capacity to about 14.4 million cubic yards, and receipt of between 250,000 and 300,000 cubic yards of waste annually.

Engineering reports required to meet the location standards of R315-305-4 including documentation of any demonstration or exemption made for any location standard (R315-310-4(2)(c)(I))

Compliance with the location standards is presented in Section VI starting on page VI-1 of this permit application.

Identification of borrow sources for final cover (R315-310-4(2)(c)(iv))

Final cover will be obtained from on-site soils stockpiled during excavations to obtain floor grades, clean soils delivered to the site as waste from construction excavations, and from weber county properties that are near the facility. Weber county currently owns undeveloped property approximately 1 mile to the west of the facility that is designated for recreational purposes. Soils may be obtained from this property to establish site grading needed for the recreational property and to meet closure needs. It is anticipated that all clean soils delivered to the site will be stockpiled for future closure, or will be placed directly on exterior and top slopes during waste placement where the waste mound has reached final grade.

Run-off collection, treatment, and disposal and documentation to show that any treatment system is being or has been reviewed by the Division of Water Quality (R315-310-4(2)(c)(v) and R315-310-3(1)(I))

All runoff that comes into direct contact with waste will be completely contained within the landfill footprint by either placing a berm around a containment area on the landfill floor, or by placing a berm or excavating a containment pond area on the waste material. The capacity of all runoff containment facilities will be 0.48 acre-foot per acre of exposed waste as provided in the design engineering report in Exhibit A.. This will provide sufficient capacity to contain runoff from the 100-year 24 hour precipitation event.

Potentially contaminated water contained within the landfill footprint will be used for dust control on the waste materials. Since evaporation far exceeds the potential precipitation rate, run-off water will be lost to evaporation from the containment areas and during dust control activities.

Since direct runoff from exposed waste areas will be contained within the landfill footprint, there will be no treatment and disposal associated with the run-off water. Therefore, there are no treatment and disposal systems proposed for review.

The site is provided with a Storm Water Pollution Prevention Plan (SWPP Plan) and has been issued a storm water discharge permit for initial construction activities. The SWPP Plan, which will be modified and updated as needed, and the storm water discharge permit is included in Exhibit H. An SWPP Plan will be completed for the site and an application will be made for a Multi-Sector General Permit (MSGP) for storm water discharges associated with industrial activities prior to facility operation.

SECTION XI

PART II
II. FACILITY TECHNICAL INFORMATION

IId. CLOSURE REQUIREMENTS - ALL FACILITIES

Closure Plan (R315-310-3(1)(h))

Final closure activities will occur in phases as portions of the waste pile reach design elevations. It is expected that perimeter side slopes will be closed with each completed lift between perimeter benches. Notification will be provided to the Utah Division of Solid and Hazardous Waste (Executive Secretary) of closure schedules 60 days prior to closing areas of the landfill. Closed areas will be seeded to promote new growth and minimize erosion.

Closure Schedule (R315-310-4(2)(d)(i))

Final closure activities at the landfill will commence within 30 days after final placement of waste at the facility and shall be completed within 180 days.

Design of Final Cover (R315-310-4(2)(c)(iii))

Design of the final cover system is provided in the design drawings in Exhibit A, Appendix 1.

Capacity of Site in Volume and Tonnage (R315-310-4(2)(d)(ii))

Site capacity is approximately 16 million cubic yards which is approximately 8 million tons using the conversion factor of 0.5 ton per cubic yard.

Final Inspection by Regulatory Agencies (R315-310-4(2)(d)(iii))

A final Inspection will be scheduled with the regulatory agencies upon closure of any part of the facility and upon final closure of the facility. Certification will be provided by the owner and/or operator of the facility of any closed areas.

SECTION XII

PART II
II. FACILITY TECHNICAL INFORMATION

IIe. POST-CLOSURE REQUIREMENTS - ALL FACILITIES

Post-Closure Care Plan (R315-310-3(1)(h))

Post-closure care will include semi-annual inspections of the facility fences, storm drainage systems, areas of excessive settlement that may adversely affect storm drainage, and closure cover. A report will be generated for each inspection conducted during the post-closure care period. The report will include areas requiring repair and maintenance.

Post closure maintenance will include repairing fences and gates, cleaning and repair of storm drainage facilities, repair of places of excessive erosion, and re-seeding as required.

Changes to Record of Title, Land Use, and Zoning Restrictions (R315-310-4(2)(e)(ii))

Plats and a statement of fact concerning the location of the disposal site shall be recorded as part of the record of title with the county recorder within 60 days after certification of final closure.

Maintenance Activities to Maintain Cover and Run-on/Run-off Control Systems (R315-310-4(2)(e)(iii))

Maintenance activities include repairing fences and gates, cleaning and repair of storm drainage facilities, repair of places of excessive erosion, and re-seeding as required based on findings during the semi-annual inspections.

List the Name, Address, and Telephone Number of the Person or Office to Contact About the Facility During the Post-Closure Care Period (R315-310-4(2)(e)(vi))

Contact information is provided below:

Weber County C&D Landfill
867 West Wilson Lane
Ogden, Utah 84401
801-399-8803

SECTION XIII

PART II
II. FACILITY TECHNICAL INFORMATION

IIf. FINANCIAL ASSURANCE - ALL FACILITIES
(R315-310-3(1)(j))

Identification of closure costs including cost calculations (R315-310-4(2)(d)(iv)

A summary of the closure cost calculations are presented Table XIII-1 - Summary of Estimated Closure Costs. Closure cost calculations were based on the cost of closing the entire site including demolition, placement of closure cover, and installation of storm drainage facilities. The costs were then averaged over the entire landfill footprint area to obtain an estimated closure cost per acre of open area and by the landfill air space to obtain closure cost per cubic yard of air space. Obtaining an average cost per acre of landfill footprint allows estimates to be made and updated annually based on the amount of are constructed and operating. Supporting closure cost calculations and supporting documentation is included in Exhibit I.

Table XIII-1
Summary of Estimated Closure Costs

Task/Service	Units	Quantity	Unit Cost	2009 Task Cost
Earthwork Construction				
Closure Soil Placement	CY	360,313	$4.28	$1,542,140
Erosion Control	Acres	112	$1,038.89	$116,356
Demolition	LS	1	$61,317.00	$61,317
Storm Drainage Control	LS	1	$33,354.00	$33,354
Subtotal				**$1,755,175**
Technical & Professional Services	LS	1	$70,113.00	$70,113
Contingency (% of construction)		10%		$175,518
Total				**$2,000,806**
Cost Per Acre	**acres**	**100.5**	**$19,909**	
Cost Per Cubic Yard of Capacity	**CY**	**16,000,000**	**$0.13**	

Identification of post-closure care costs including cost calculations (R315-310-4(2)(e)(iv))

A summary of post-closure cost calculations are presented in Table XIII-2 - Summary of Estimated Post-Closure Costs. Post-closure cost calculations were based on the cost per year including inspections and maintenance. The costs were then averaged over the entire landfill footprint area to obtain an estimated post-closure cost per acre of open area and by the landfill air space to obtain post-closure cost per cubic yard of air space. Obtaining an average cost per acre of landfill footprint allows estimates to be made and updated annually based on the amount of are constructed and operating. Supporting post-closure cost calculations and supporting documentation is included in Exhibit I.

Table XIII-2
Summary of Estimated Post-Closure Costs

Task/Service	Quantity	Units	Unit Cost	2008 Task Cost
Post Closure Inspections	30	Yr	$2,400	$72,000
Repair/Maintain Cover	30	Yr	$11,264	$337,920
Subtotal				**$409,920**
Contingency (% of Cost)	1	LS	10%	$40,992
Total				**$491,904**
Cost Per Acre	**acres**	**100.5**	**$4,895**	
Cost Per Cubic Yard of Capacity	**CY**	**16,000,000**	**$0.03**	

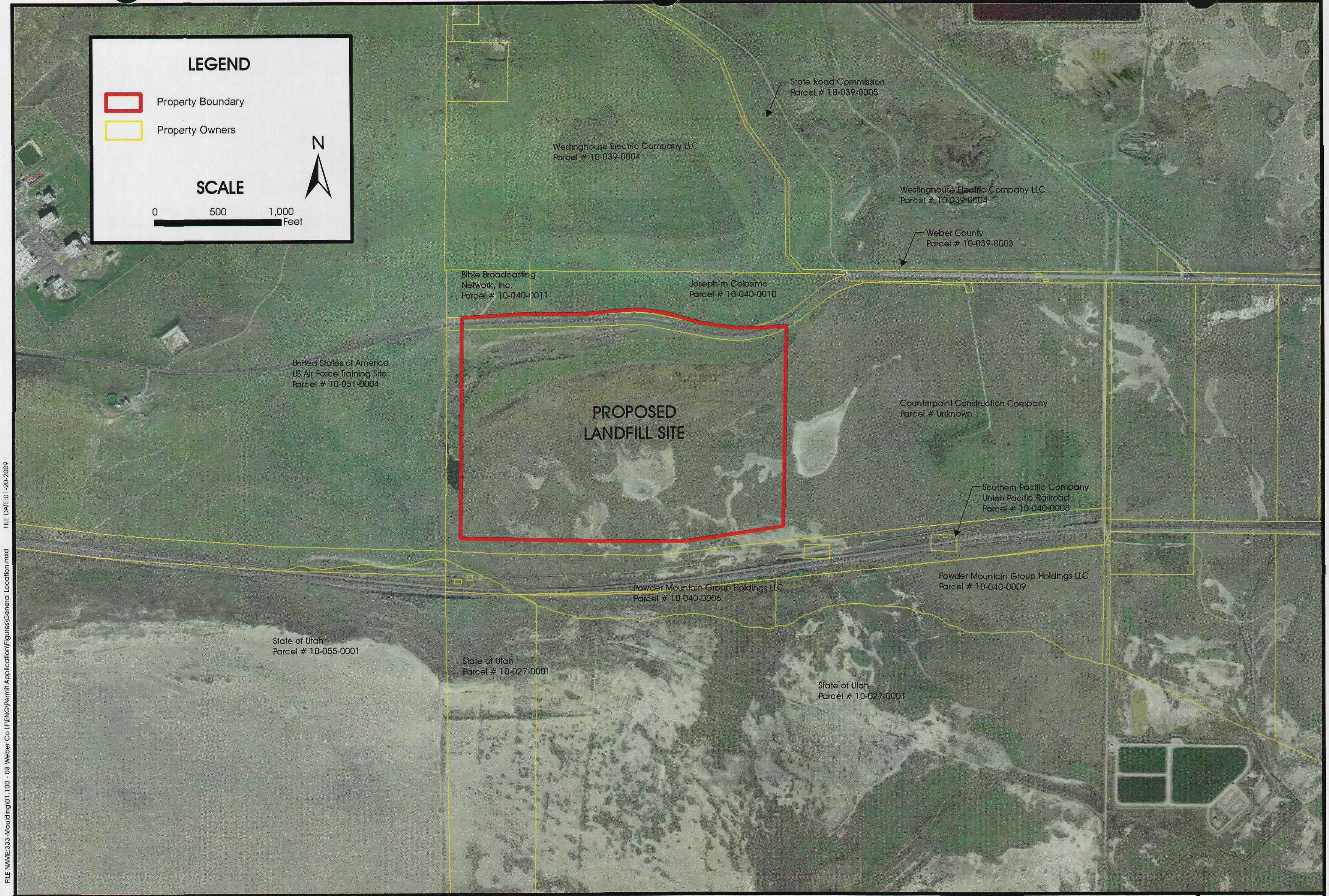
Notes:

1. Time of post-closure care may be reduced based on site stabilization, with DEQ approval.

Identification of the financial assurance mechanism that meets the requirements of Rule R-315-309 and the date that the mechanism will become effective (R315-309-1(1))

Weber County proposes to use the local government financial test as provided in R315-309-8. The local government test will be completed with required information prior to the landfill receiving waste.

FIGURES



FILE NAME:333-Moulding\01.100 - 08 Weber Co LF\ENG\Permit Application\Figures\General Location.mxd FILE DATE:01-20-2009

HANSEN ALLEN & LUCE inc ENGINEERS

WEBER COUNTY CLASS IVb C & D LANDFILL
GENERAL LOCATION

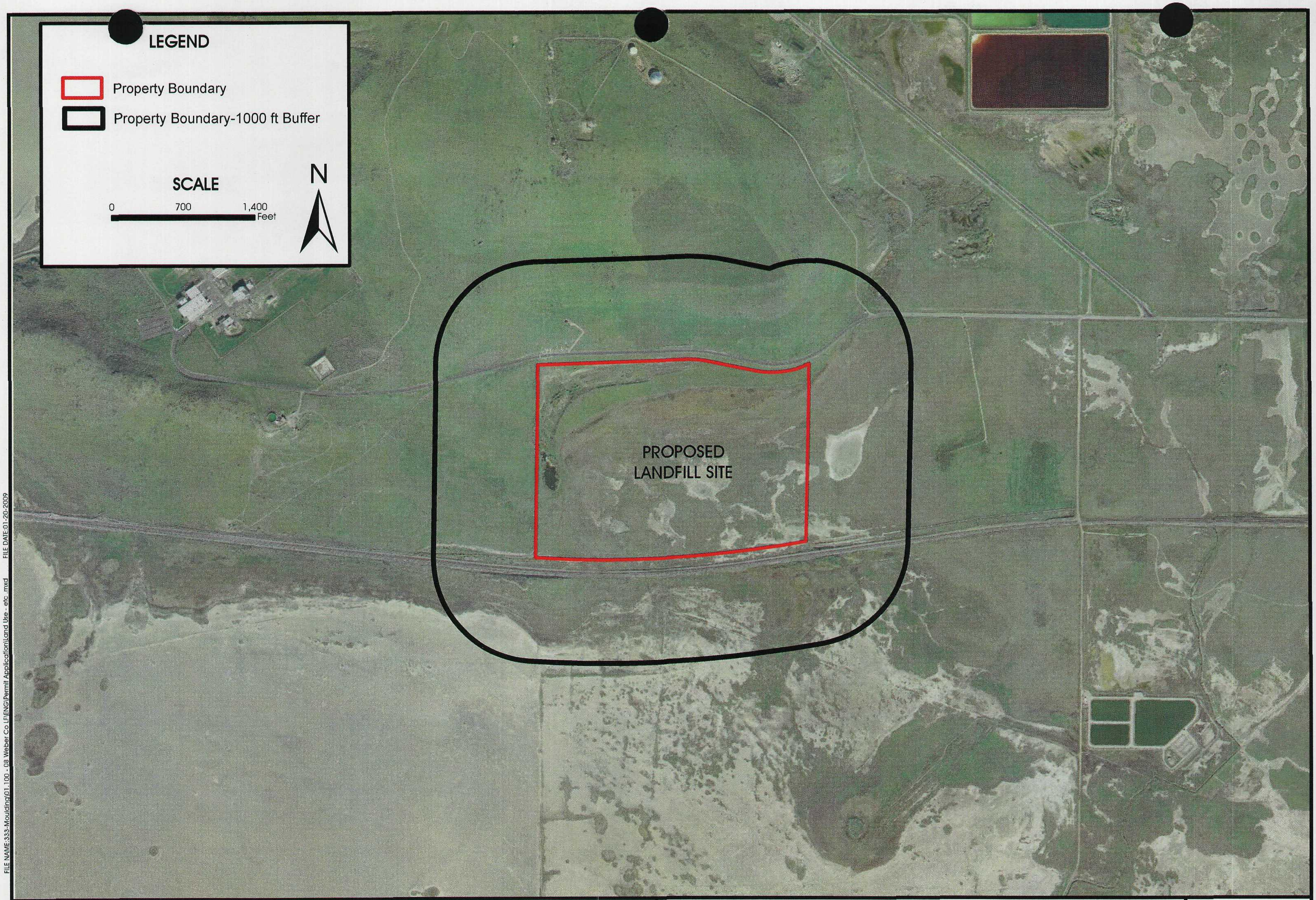
FIGURE 1

FILE NAME:333-Moulding\01 100 - 08 Weber Co LF\ENG\Permit Application\Figures\100 Year Flood Plain.mxd
FILE DATE:01-20-2009

HANSEN ALLEN & LUCE inc ENGINEERS	WEBER COUNTY CLASS IVb C & D LANDFILL	R315-302-1(2)(a)) Floodplains. No new or existing facility shall be located in a floodplain.	FIGURE 2

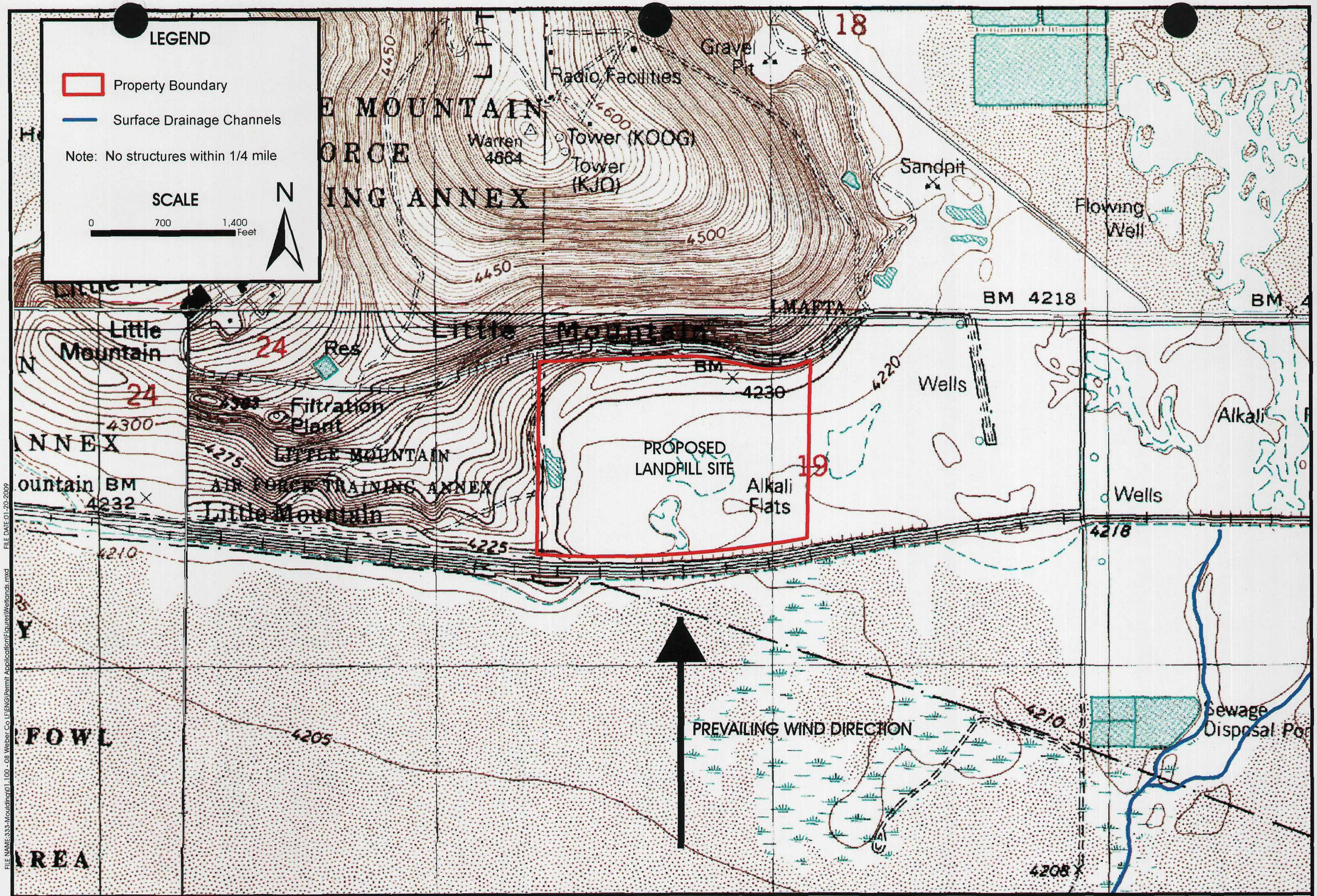
FILE NAME:333-Moulding\01.100 - 08 Weber Co LF\ENG\Permit Application\Figures\Wetlands.mxd FILE DATE:01-20-2009

HANSEN ALLEN & LUCE inc ENGINEERS	WEBER COUNTY CLASS IVb C & D LANDFILL WETLANDS MAP	R315-302-1(2)(d)) Wetlands. No new facility or lateral expansion of an existing facility shall be located in wetlands.	FIGURE 3



FILE NAME:333-Moulding\01.100 - 08 Weber Co LF\ENG\Permit Application\Land Use - etc.mxd FILE DATE:01-20-2009

HANSEN ALLEN & LUCE inc ENGINEERS	WEBER COUNTY CLASS IVb C & D LANDFILL GENERAL LOCATION REQUIREMENTS	No Residental Areas, Dwellings, Parks, Monuments, Historic Structures, Recreation Areas, or Wilderness Areas are located within the extents shown on this figure.	FIGURE 4



HANSEN ALLEN & LUCE INC ENGINEERS	WEBER COUNTY CLASS IVb C & D LANDFILL QUAD MAP WITH PREVAILING WINDS	R315-310-4(2)(a)(ii) Prevailing wind direction measured at the Ogden Airport is directly south. Wind data was provided by the Western Regional Climate Center website at www.wrcc.dri.edu/htmlfiles/westwinddir.html	FIGURE 5

FILE NAME:333-Moulding\01.100 - 08 Weber Co LF\ENG\Permit Application\Figures\Wetlands.mxd FILE DATE:01-20-2009

EXHIBIT A

WEBER COUNTY

CONSTRUCTION AND DEMOLITION LANDFILL

DESIGN ENGINEERING REPORT

Prepared by:

Hansen, Allen & Luce, Inc.
Consulting Engineers
6771 South 900 East
Midvale, Utah 84047

January 2009

WEBER COUNTY

CLASS IVb C & D LANDFILL PERMIT
DESIGN ENGINEERING REPORT

PROFESSIONAL ENGINEER
1-19-2009
No. 169141-2202
KENT C.
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Project Engineer

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January 2009

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CHAPTER I

INTRODUCTION

Hansen, Allen & Luce, Inc. was retained to provide engineering design services for a proposed Construction and Demolition (C&D) landfill to be located on approximately 110.7 acres of land located in the Northwest Quarter of Section 19, Township 6 North, Range 3 West, Salt Lake Base and Meridian. The property for the landfill has an address of 10485 West 900 South and is located between the base of the south side of Little Mountain in Weber County and the Union Pacific Railroad line as presented on Sheet C-1 of the attached drawings.

The proposed landfill and property will be owned by Weber County and will be operated by Moulding and Sons Landfill, LLC. under contract with Weber County.

The overall facility will consist of a C&D landfill with an air space capacity of about 16 million cubic yards (8 million tons), a future green waste recycling area, storm water control facilities, and operational facilities consisting of an office and a future shop. This report provides design related information for permit approval of the C&D landfill by the Utah Division of Solid and Hazardous Waste according to the requirements of the Utah Administrative Code for a Class IVb C&D Landfill. Weber County planning and zoning will provide review and approval of the design associated with the operational facilities (entrance, office, shop, utilities, etc.). Design information associated with these facilities are, therefore, not included in this report and are only presented as conceptual in the drawings.

This report provides general information, location standards compatibility, and ground water information. Also presented herein is information associated with landfill, landfill closure, and storm water management systems design.

CHAPTER II

GENERAL INFORMATION

ACCESS

The proposed landfill is to be located in an M-3 (heavy manufacturing) zone within an unincorporated area of Weber County. Primarily access to the proposed facility is along 900 South, which is a main artery to access developments within the M-3 zone. An access drive will be constructed into the facility approximately 500 feet west of the east property line for the landfill site. A gate will be installed at the entrance that can be closed and locked to provide access security during non-operating hours. A 6-foot high chain link fence will be installed for a minimum distance of 50 feet on either side of the gate.

SIGN

A sign will be installed at the facility entrance that will be approximately 4 feet by 8 feet in size and will be constructed of steel materials. The sign will advertise at least the facility name, operating hours, unacceptable wastes, and an emergency telephone number as required by R315-303-3 (7)(d) of the Utah Administrative Code.

SECURITY

A fence will be installed around the facility perimeter to provide for facility security. The fence will generally consist of either 5 strands of barbed wire or mesh wire with the exception of the 6-foot high chain link fence and gate at the facility entrance.

OPERATIONAL FACILITIES

An office will be provided meeting the requirements of Weber County to accommodate administrative and operational activities and personnel. The office will provide for observation of vehicles entering and exiting the site, checking in and documenting loads of waste received, and for keeping and storing records. Sufficient parking will be provided under the direction of Weber County for personnel employed at the landfill and for visitors Area has also been provided for a future shop to be constructed as needed in the operational area.

TRAFFIC

Traffic to the facility will be generated by employees required to operate the facility, occasional visitors, and vehicles hauling waste to the facility. It is anticipated that there may be five employees to operate the facility for an average of 5 vehicles per day, and an average of about 50 trucks per day hauling waste to the facility. The number of trucks will depend highly on the season and the amount of construction and demolition that may occur in any one year. Typical trucks that will be hauling waste to the landfill include end dump trucks, end dump trucks with pups, and trucks pulling single and double trailers. There may be occasional pickup trucks with utility trailers and utility dump trailers. It is anticipated that small personal loads will generally go to the Weber County transfer station on 21st street rather than directly to the landfill.

UTILITIES

Utilities will be provided in meeting the requirements of Weber County Planning and Weber County Health Department.

Power

There is currently a 3-phase underground power line that runs along the north side of the improved road to the facility property. Power will be installed to the facility as a single phase underground service line from the main power line.

Water

Water will be required to meet demands for culinary uses and fire flow, and for construction and dust control. An 8-inch diameter water lateral will be constructed to the facility from one of two culinary water suppliers in the area to meet culinary and fire flow requirements. A fire hydrant will be installed near the office and future shop. Water Rights may also be acquired to drill a new water well on the property as the primary source of water for construction and dust control.

Sewer

There are no sewer lines near the facility to provide a service connection. Approval was granted by the Weber-Morgan Health Department for a septic system based on a percolation test that was conducted at the location of the office.

Telephone

Cellular telephone communication services may be used for the site. However, there is an existing Qwest telephone line along the north side of the property from which telephone communications may also be obtained.

Gas

Natural gas is not anticipated since the office will most likely be "all electric" and does not use gas for any of the heating requirements. Should natural gas be required at some time, there is an existing natural gas line owned by Questar Gas that runs along 900 South ending near the site from which a gas lateral may be constructed.

WASTE TYPES

The permit obtained from the State of Utah Department of Environmental Quality - Division of Solid and Hazardous Waste is expected to include all Class IVb waste types. These waste types may include:

- Construction/demolition waste;
- Yard waste;
- Inert waste;
- Dead animals upon, as approved by the Executive Secretary and upon meeting the requirements of R315-315-6 which provide for disposal, burial and cover requirements for dead animals;
- Non-hazardous petroleum contaminated soils containing the following constituents below the following levels:

    - Benzene, 0.03 mg/kg;
    - Ethylbenzene, 13 mg/kg;
    - Toluene, 12 mg/kg; and
    - Zylenes, 200 mg/kg

- No wastes wastes will be accepted from a conditionally exempt small quantity generator of hazardous waste will be accepted.

LANDFILL OPERATION AND LIFE

Landfill Operation

The landfill is expected to begin operation in early 2009, or as soon as permits can be obtained from Weber County Planning and the State Division of Solid and Hazardous Waste. Waste disposal is expected to begin in the northwest corner of the proposed landfill area and will continue toward the south and east as needed to accommodate air space and operational requirements. Closure of the landfill will occur as soon as possible in areas where design waste grades have been achieved.

Approximate floor grades will be established as needed prior to disposal of waste in designated landfill areas. Grading of the floor will proceed as needed in order to open expanded areas for operation within the proposed landfill footprint.

Soil wastes (typically obtained from excavations on construction projects) are generally suitable for use to cover waste materials as needed for litter and vector control and as a final cover. These soils will be segregated from other wastes and stockpiled for future use. Other inert "heavy wastes" such as masonry, road demolition wastes, concrete, soils not suitable for final cover, etc. will segregated as much as possible and will be used to cover wastes as needed for litter and vector control.

Class IVb landfills are not subject to a bottom lining system because of the inert or otherwise non-hazardous nature of the waste materials received for disposal. A leachate collection and removal system that accompanies a lining system is, therefore, not required. Groundwater monitoring is also not typically required for Class IVb landfills and is not anticipated considering the type of landfill and the poor quality of ground water exiting the site.

Estimated Landfill Life

The landfill has an estimated life of 50 years within the currently proposed footprint and waste grade plan.

LITTER CONTROL

Litter blowing from the landfill will be controlled by placing 6 inches of a suitable cover material over waste materials subject to wind dispersion. Should litter be disbursed off the landfill by wind, facility personnel will scout areas immediately surrounding the landfill property and return the litter to the landfill for disposal.

Debris fences will also be used as needed near the working faces of the waste disposal areas to assist in trapping blowing debris. Litter trapped by debris and facility fences will be cleaned up and disposed back in the landfill on a regular basis and covered with appropriate cover materials.

CHAPTER III

GROUNDWATER

CURRENT GROUNDWATER CONDITIONS

Literature and Water Rights Research

A search of water rights and known groundwater wells was completed in the area and data was obtained from two wells located in Section 19, located on the parcel of property east of the proposed facility within a distance of about 1/2 mile. One well showed a water-bearing gravel layer at a depth of 36 feet and the other well did not report water bearing formations until 188 feet in depth. Both of these wells were drilled over fifty years ago. The proposed facility is in an area where ground water levels are obviously higher than reported with the two wells presented.

Geotechnical Investigation

Between the dates of April 8 and April 30, 2004, 8 borings (B-1 through B-7, including B-1A) and 8 test pits (TP-1 through TP-8) were completed associated with the Geotechnical Investigation Report completed by Applied Geotechnical Engineering Consultants (AGEC) provided with this report. Groundwater was encountered at depths ranging from approximately 6 to 12 feet based on measurements taken several months after the initial drillings and excavations were completed and sufficient time was allowed for recovery of ground water. No groundwater was found in Borings B-1, B-2 and B-3 because the borings were drilled in the higher elevations of the site and refusal of deeper boring was encountered due to bedrock and/or other larger subsurface rocks.

A survey was completed at the site in order to establish coordinate and elevation controls and to obtain locations and elevations of the borings and test pits. This survey provided the basis for establishing elevations associated with the observed groundwater levels and to establish contours associated with the ground water levels. The following table provides a summary of these elevations and the design drawings show ground water contours generated from the tabulated data which also shows a comparison between ground water and the existing ground surface.

General regional ground water flow is from the northeast toward the southwest or toward the mud flats and the Great Salt Lake located south and west of the proposed facility. Local ground water flows generally follow the ground surface topography which is from the north to the south from little mountain and a component from the west to the east from the higher ground located west of the proposed facility. There is an abandoned gravel pit are located along the north half of the west side and along about the west third of the north side of the proposed facility. Storm water runoff from the area of Little Mountain located upgradient from the gravel pit area is currently directed into the gravel pit which appears to influence ground water gradients across the property. During facility development, a storm water ditch will be constructed along the north side of the property that will direct Little Mountain runoff around the facility and away from the gravel pit and active landfill areas. It is expected that re-directing this runoff will most likely alter recharge that previously occurred in the gravel pit area, since this area will become part of the landfill footprint. Changes that may occur include removing much of the ground water gradient from the west side of the property toward the east and generally lowering ground water levels across the property.

TABLE III-1 TEST PIT AND BORING LOCATION AND GROUNDWATER ELEVATION INFORMATION

BORING NUMBER	NORTHING	EASTING	GROUND ELEVATION	GROUND WATER ELEVATION	DEPTH TO GROUNDWATER
TP-1	3614389.75	1439372.56	4217.63	1	1
TP-2	3615214.86	1439452.36	4218.47	4212.66	5.81
TP-3	3615619.42	1439552.59	4222.45	4216.66	5.79
TP-4	3614366.04	1438437.75	4220.69	4214.25	6.44
TP-5	3614956.68	1438431.17	4219.75	4214.53	5.22
TP-6	3614595.76	1440318.34	4215.35	4210.21	5.14
TP-7	3615281.4	1440362.2	4220.49	4213.63	6.86
TP-8	3615681.49	1440341.82	4222.85	4216.05	6.80
B-1A	3615918.39	1437907.16	4230.59	4218.73	11.86
B-4	3614341.62	1439827.63	4216.15	4207.64	8.51
B-5	3615515.08	1438657.22	4223.62	4214.40	9.22
B-6	3615615.35	1439596.51	4223.80	4218.24	5.56
B-7	3614416.05	1439014.48	4218.03	4210.81	7.22

Notes: 1. Test Pit TP-1 observation PVC pipe had been broken off at the surface by cattle and had partially filled with dirt. Ground water measurements could not be obtained at this location.

CHAPTER IV

LANDFILL DESIGN

This section presents the general layout and design concept for the landfill area and also presents more specific design information for the floor layout, interior runoff control, and exterior run-on control. Reference is made to the design drawings included with this report for this section.

GENERAL LAYOUT AND DESIGN

The C&D facility consists of one large landfill footprint area. The C&D is designed with a total surface area of approximately 98.5 acres. An operational and staging area is planned at the northeast corner of the facility. Dimensions of this operational and staging area are roughly 325 feet by 1,000 feet. The operational area will include an office and parking area, a future shop, and an area for potential recycling of green wastes.

Construction of the landfill footprint will occur in phases based on operational needs and C&D waste disposal demands. It is anticipated that construction of the landfill footprint will begin in the northwest corner of the property and will occur in phases toward the south and east as additional cell space and area is required.

Floor Elevations

Regulations state that the separation between the floor of the C&D landfill and the groundwater surface should be 10 feet or more. Water quality samples were obtained from borings B-4 and B-7 to determine the quality of the ground water at the site. Results from the samples show TDS levels of 29,000 and 23,000 mg/L, for the samples obtained from B-4 and B-7, respectively. Ground water is very poor quality and is classified as Class IV groundwater according to State standards.

Permeability tests were also conducted on the lean clay obtained from TP-1 about 1 foot below existing ground and from the interlayered lean clay and silt formations obtained from TP-7 approximately 2.5 feet below existing ground at the site. Results of the tests show the lean clay and the interlayerd lean clay and silt to have permeability values of 2×10^{-6} cm/sec and 2×10^{-7} cm/sec, respectively.

Because of the poor quality, the low permeability of the clays and silts immediately below the landfill footprint, and based on discussions with the Division of Solid and Hazardous Waste, a variance is requested from 10 feet to 5 feet of separation between the bottom of the waste and ground water. It is our opinion that degradation to ground water will be negligible due to the types of the wastes that will be received, the poor quality of ground water that exists at the site, the low permeability of the existing soils, and storm water management practices that will be implemented (presented later in this report).

between 6 feet and 7 feet although future ground water levels are expected to lower resulting from construction of the landfill, removal of the existing gravel pit where recharge occurs, and re-directing storm water from little mountain away from the gravel pit area and around the east side of the landfill property.

Both cuts and fills will be required to achieve the design floor elevations presented in the drawings. Fill materials may be obtained from native soils during excavations in the landfill footprint area, from inert waste materials such as concrete, masonry, soils, etc, and from off site soil sources. Significant cuts are anticipated in the northern and western portions of the property and fills will generally be required in the lower playas areas. Although significant cuts are anticipated along the north and west sides of the property, the design side slopes presented may be flatter and the cuts may be less should bedrock be encountered that inhibits these excavations to occur.

Embankments and Waste Mound

Very little embankment construction is expected with most of the fill areas occurring to establish floor grades and to establish storm water control facilities. The waste mound will begin generally at the floor elevation (toe of waste) around the floor perimeter along the south, east, and part of the north sides and at the top of the cut slopes along the rest of the north side and the west side. The waste mound will consist of four lifts that are approximately 50 feet or less in height. A bench approximately 18 feet wide is provided at the top of each lift to provide for storm water conveyance and to provide for a resulting 3H:1V (horizontal to vertical) slope after accounting for the benches in order to maintain stability of the landfill slopes. The entire vertical height is generally between about 180 feet near the southeast corner of the waste mound to about 230 feet from the center peak of the waste mound to the floor. Fill materials needed to construct the landfill access ramps will most likely also be constructed of waste materials after first establishing a minimum bottom grade consistent with the extension of the floor slopes.

The top of the waste mound consist of an approximate 10 percent slope between the top outer perimeter and the center of the waste pile to promote storm water runoff to occur toward the outside perimeter and to a storm water down drain to be installed at the southeast corner of the waste pile. Storm water management is discussed later as part of the landfill closure section.

A stability analysis was conducted on the waste mound slopes during the geotechnical investigation. The stability analysis shows safety factors of 1.8 under static conditions and 1.2 under seismic conditions. The geotechnical report is included as an appendix in this report.

ACTIVE AREA RUNOFF CONTAINMENT

Runoff from exposed waste materials will be contained on-site within the active landfill footprint area until the waste either receives a clean soil cover or until the time of closure. As portions of the landfill receive clean cover soils or are closed, runoff from the clean and closed area will be conveyed off the waste pile and will be allowed to discharge off-site.

Regulations require containment be sufficiently sized to contain runoff from the 25-year 24-hour precipitation event. Potential runoff volume per acre of open cell area was calculated using the SCS curve number methodology provided in "USDA Urban Hydrology for Small Watersheds, Technical

Release No. 55." Precipitation depth for the 25-year 24-hour precipitation event (2.23 inches) was obtained from Point Precipitation Frequency Estimates from NOAA Atlas 14."

Using charts provided in TR-55, a curve number of 87 was selected assuming a combination of Type C soils which are typical of on-site soils and some impervious waste material. Calculations resulting from the assumptions made result in a minimum containment volume of 0.48 acre-foot (20,908 cubic feet) per acre of open cell area. This containment capacity may be provided using pond areas on the landfill floor between the waste and the up-gradient interior slopes of the landfill, providing ponds or berms on the waste surfaces, or by providing pond areas on the landfill floor by constructing berms down gradient from the waste. This runoff water may be used for dust control within the landfill area, mixing of concrete, and other activities requiring water above constructed landfill floor areas.

CHAPTER V

LANDFILL CLOSURE DESIGN

Design objectives for the C&D Cell closures is to provide a final waste grade, final soil cover, and erosion protection that will promote and control storm water runoff from the closed cells and control erosion. This section presents the general layout and design concept for the landfill cell closure caps including storm water control and erosion control.

GENERAL LAYOUT AND DESIGN

The waste grade layout provides resultant 3H:1V (horizontal to vertical) slopes extending up from the bottom toe of the waste pile toward the center of the landfill. Intermediate benches are provided every 50 feet of vertical rise to facilitate erosion control and storm water management. The intermediate benches are 18 feet wide and slope toward the inside of the bench providing a 3-foot deep V-ditch. Side slopes between benches are 2.5H:1V and when combined with the benches provides resultant slopes of 3H:1V. The maximum height of the closure caps is about 180 to 200 feet around waste pile perimeter with a maximum of about 230 feet above the floor at the center peak of the waste pile.

Two feet of cover soil will be placed at final closure consisting of a clean soil fill material with an erosion protective layer. This final closure cover will consist of either 18 inches of soil fill with 6 inches of soil that will support vegetation, 20 inches of soil fill with 4 inches or stone mulch, or a combination of both.

Each of the intermediate benches is provided with approximately a 1 percent slope toward the southeast corner of the landfill to form "V-type"drainage ditches that are approximately 3 feet deep. The drainage ditches have side slopes of 20H:1V or 5 percent provided by the bench) and the 2.5H:1V (provided by the general closure cap surface). The ditch flow lines convey storm water to inlet boxes and downspout pipes located at the southeast corner of the landfill.

The top closure surface will consist of approximately 10 percent slopes from the center toward the outer perimeter of the top surface. A 3-foot high berm system will be constructed around the outside perimeter of the top slope that will contain storm water and convey the runoff toward the southeast corner where it will enter the down drain system to be constructed at the southeast corner of the landfill. Storm water runoff from the landfill will enter the upper east and southeast detention ponds and will ultimately be discharged off site toward an existing culvert under the railroad near the southeast corner of the landfill.

STORM WATER MANAGEMENT

The objectives of storm water management associated with the closure caps is to control erosion and convey storm water from the closure cap surfaces during precipitation events and snow melt. The following paragraphs present the hydrology and hydraulic design associated with the storm water management system.

Hydrology

Hydrologic calculations were completed for the closure cap of the C&D landfill to determine peak runoff in designing the bench drainage ditches and to determine erosion protective measures for the drainage ditches and the closure cap slopes. The SCS (Soil Conservation Service) curve number methodology was used in conjunction with the Army Corps of Engineers HEC-HMS hydrology computer model to predict peak flows from the closure cap. The methodology for predicting peak flows requires a delineation of the sub-basins generating runoff, determination of a curve number to be used, a precipitation rate, a storm distribution, and a calculation of the time of concentration and lag time.

<u>Methodology.</u> The sub-basins were delineated assuming each is comprised of the perimeter slope above each of the bench areas including the bench area at the bottom of the perimeter slope, and the perimeter slope above the ground surface. The landfill area has 7 delineated subbasins with an additional subbasin for the operations and staging area. Each of the 4 subbasins, comprised of the bench areas and the slope areas above the benches, will generate runoff that will collect in the ditches on the benches and the runoff will be conveyed around the benches to the southeast corner. Runoff will then be conveyed through inlet boxes and down drain piping to the ground surface. Runoff from the 3 subbasins on the lower slope areas will collect on the ground surface and the detention ponds at the toe of the slopes.

The SCS curve number is determined from the type of soil and erosion control measures used for the closure cap. The closure cap will be seeded with native grass or other range grasses and brush that adapt to the area, which when established will result in an assumed curve number of 81.

Native soils at the site and clean imported soils are expected to be used for construction of the closure caps. The types of soils from NRCS soil mapping showed hydrologic soil group type C soils on the landfill parcel and should also provide an average type of soils that may be imported. Type C soils have low infiltration rates when thoroughly wetted, consist chiefly of soils with a layer that impedes downward movement of water, and have moderately fine to fine texture. These soils also have a low rate of water transmission. An SCS curve number (CN) of 81 was selected using the tables provided in TR-55 using an herbacious cover with type C soils.

Regulations required that the facilities be designed for a 25-year 24-hour precipitation event. Since a closure cap is a critical component, our calculations for storm water management from the closure caps are based on the 100-year 24-hour precipitation event. The "Point of precipitation frequency estimates from NOAA Atlas 14" was used to determine the precipitation depth of 2.73 inches and the SCS Type II storm distribution for a 24-hour event was used to predict peak flows.

<u>Peak Design Flows.</u> Hydrologic calculations presented above were used to generate peak design flows for each of the 8 subbasins for the closure cap and for the downspout piping located at the southeast corner. Peak design flows for each of the subbasins are summarized in Table VI-1. Peak design flows for the downspout piping were generated using HEC-HMS computer model to combine flows from the individual sub-basins. These flows are summarized on Table VI-2.

Table V-1 SUBBASIN PEAK DESIGN FLOWS

HEC-HMS SUBBASIN ID	SUBBASIN DESCRIPTION	PEAK FLOW (cfs)
Subbasin - 1	Top of the landfill to first bench	9.5
Subbasin - 2	Second bench from top	3.9
Subbasin - 3	Third bench from top	5.3
Subbasin - 4	Fourth bench from top	5.8
Subbasin - 5	Northeast base of landfill from fourth bench to ground surface	6.1
Subbasin - 6	West base of landfill from fourth bench to ground surface	7.4
Subbasin - 7	Southeast corner of landfill from fourth bench to ground surface	9.8
Operational Area	Operations and staging area in northeast corner of the parcel	10.9

TABLE V-2 DOWNSPOUT PIPING PEAK DESIGN FLOWS

HEC-HMS REACH ID	DOWNSPOUT PIPE SECTION DESCRIPTION	PEAK FLOW (cfs)
Reach - 3	First bench to second bench	9.5
Reach - 2	Second bench to third bench	12.0
Reach - 1	Third bench to fourth bench	15.3
Reach - 4	Fourth bench to Detention	19.2

Hydraulic Design

Peak design flows were used to complete hydraulic design of the drainage channels and the downspout piping for the closure cap.

Drainage Channels. The highest design peak flows for the benches and for the flow to the ground surface provided in Table VI-1 were used to design the drainage ditches. This provides consistency in the design, in achieving final waste grades during operation and in constructing

A channel flow depths of approximately 0.63 feet was calculated for the bench ditches using the peak design flow of 4.75 cfs (half of the maximum flow from the peak basin Subbasin 1). Using a manning's n of 0.30 (assuming grass/weed lined channels), the resulting velocity is 2.4 ft/sec. The grass and weed lined channel with this low velocity would not require the use of riprap for erosion protection.

Periodic check dams constructed of gravel may be placed periodically for the purpose of minimizing erosion and retaining some moisture to establish vegetation within the drainage benches.

Downspout Piping. Hydrologic calculations presented above were used to generate the combined peak design flows for the C&D closure cap. Design is based on the combined peaks shown in Table VI-2, starting with a flow of 9.5 cfs at top bench and progressing to 19.2 cfs at the outlet of the downspout piping. "Hydraulic Charts for the Selection of Highway Culverts" published by the U.S. Department of Transportation were used for sizing the downspout piping. The required pipe diameter is 18 inches for the top downspout reach and 21 inches thereafter to the outlet based on Inlet control conditions with a head water depth requirement of no greater than four feet, allowing for one foot of freeboard. This headwater depth requirement is provided within the 24 inches of inlet box depth below the grating with the additional depth provided by the approximately 3 foot ditch above the grating.

Slope Erosion Protection

The establishment of vegetation has proven to be an effective practice in providing erosion protection for highway cut and fill slopes, downstream slopes of dams, and landfill closure caps within the state of Utah. Procedures presented in "Erosion and Sedimentation in Utah - A Guide for Control" published by the Utah Water Research Laboratory were used to determine requirements for vegetative control measures. Calculations show that the density of a vegetative cover should be 97 percent. In order to determine the effectiveness of a vegetative cover appropriate for the climate and soils used for the final cover, the slope below the lowermost drainage bench should be used to test the seed mix provided and adjust the seed mix based on the results of the test area. Initial seeding should include a mix design similar to mix presented in Table V-3. Test areas for seeding on the lower slope will provide a basis for determining erosion control measures for final closure. Erosion control blankets may also be used as needed during establishment of vegetation.

Calculations also show that erosion control can be accomplished by placing a minimum thickness of 2.5 inches of stone mulch over the final closure areas. Stone mulch has also been effectively used for erosion protection on highway cut and fill slopes, and on landfill closures around the state of Utah and has shown to allow natural vegetation to establish itself through the stone mulch cover. During testing of the lowermost slope, a determination might be made that erosion control measures are best accomplished by using a combination of vegetation and stone mulch where vegetation is established on the upper portions of the slopes where runoff water is not concentrated and stone mulch is placed on the lower slope areas where runoff water is more concentrated.

TABLE V-3 SEED MIX DESIGN

Common Name	Species Name	Application Rate (PLS) (lbs/acre)
Grasses		
'Hycrest' crested wheatgrass	Agropyron cristatum 'hycrest'	3.0
Intermediate wheatgrass	Agropyron intermedium	2.0
Western wheatgrass	Agropyron smithii	2.0
Indian ricegrass	Oryzopsis hymenoldes	2.0
Great Basin wildrye	Elymus cinereus	1.0
Alkali sacaton	Sporobolus airoides	0.1
Forbs		
Scarlet globemallow	Sphaeralcea coccinea	0.5
Shrubs		
4-wing saltbush	Atriplex canescens	1.0
Shadscale	Atriplex confertifolia	1.0
Forage kochia	Kochia prostrata	0.5
TOTAL		13.1

CHAPTER VI

STORM WATER MANAGEMENT

Open Landfill Areas

Berms or ditches will be constructed around open landfill areas to manage storm water from surrounding areas from entering the open landfill areas. Berms will be constructed in phases around the landfill as areas are opened for waste disposal. These berms will also provide a safety barrier to restrict vehicle traffic from entering the open landfill other than by established accesses.

Off-Site Run-On Storm Water

The gradient of the existing ground surface is toward the south and southeast from Little Mountain and through the facility. There are several culverts that cross under 900 south that convey water from the Little Mountain drainage and run-on through the C&D facility property. There are no defined natural drainage channels

A hydrologic computer model was developed to predict peak flows from the drainage area expected to contribute to run-on flows that affect the facility property using the 100-year 24-hour storm event. The drainage area comprised one subbasin that could be characterized by soil types, vegetative cover, slope, and precipitation depth.

An SCS curve number was established for each subbasin based on soil types and vegetative cover characteristics. Vegetation cover was defined based on observations made during field visits. Soil types were obtained from the Natural Resource Conservation Service website from soil mapping available at the Soil Data Mart.

Precipitation depths were obtained for the subbasin from the Point Precipitation Frequency Estimates from NOAA Atlas 14. One precipitation value was used (2.73 inches) dependent upon the general elevation of the facility and the area tributary to it. The SCS Type II storm distribution was used which is typical for this area.

Run-on areas will be allowed to temporarily discharge onto open areas of the property as currently occurs until the landfill expands to where those open areas would be unavailable. When expansion to those areas does occur, run-on will be conveyed through a ditch along the north side of the property and into the detention system that has been designed for closure conditions.

This Little Mountain storm water conveyance ditch will have a slope that will vary from about 0.5% and 1% with 2.5H:1V side slopes resulting in a V-shaped channel with no bottom width. The maximum depth calculated for this channel is 1.2 feet with a peak flow of 9 cfs and a minimum channel slope of 0.5%. In order to provide 1 foot of freeboard a depth of 2.2 feet is required. The maximum calculated velocity is 3.3 fps with the maximum slope of 1%.

Results from the calculations attached to this report show a peak flow from water ultimately diverted around the north side of the facility and to the east through the detention basins and eventually exiting the property from the existing culvert in the southeast corner. The peak flow that will ultimately be diverted south and east around the facility from off-site run-on is approximately 9 cfs. The detention basins have been designed to accommodate both run-on from off-site and run-off from the facility.

Storm Water From On-Site Disturbed Areas Outside Landfills

Storm water from disturbed areas outside the landfill around the facility may include operation area, roads, staging area, soil stock piles, etc. The amount of disturbed area will be minimized as much as practical and still allow for operations and construction of the facility. Runoff from these areas will be collected and conveyed to a detention pond located at the southeast corner of the operations and staging area. This pond has been sized for the 100-year 24-hour precipitation event.

A drainage channel will be located south of the operations area providing conveyance from the operations area to the pond. This ditch will have a slope that will vary from 0.5% and 1% with 2.5H:1V side slopes resulting in a V-shaped channel with no bottom width. The maximum depth calculated for these channels is 1.3 feet with a peak flow of 10.9 cfs and a minimum channel slope of 0.5%. In order to provide 1 foot of freeboard a depth of 2.3 feet is required. The maximum calculated velocity is 3.5 cfs with the maximum slope of 1%.

REFERENCES

Federal Highway Administration, U.S. Department of Transportation, Hydraulic Charts for the Selection of Highway Culverts, U.S. Government Printing Office, June 1980.

Applied Geotechnical Engineering Consultants, Inc., Geotechnical Investigation- Proposed Landfill - 10500 West 900 South - Plain City, Utah, November 11, 2008.

National Oceanic and Atmospheric Administration (NOAA), Point Precipitation Frequency Estimates from NOAA Atlas 14, National Weather Service, Maryland 2003.

U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-HMS Hydrologic Computer Modeling Software.

U.S. Department of Agriculture, Natural Resources Conservation Service, Urban Hydrology for Small Watersheds, Technical Release No. 55 (TR-55), June 1986.

Utah Water Research Laboratory, Erosion and Sedimentation in Utah: A Guide for Control" Utah State University, February 1984.

APPENDIX 1

DESIGN DRAWINGS
WEBER COUNTY CLASS IVb
C & D LANDFILL PERMIT

WEBER COUNTY

CLASS IVb C&D LANDFILL PERMIT

JANUARY 2009

INDEX OF DRAWINGS

PROFESSIONAL ENGINEER
1-19-09
No. 169141-2202
KENT C. STAHELI
STATE OF UTAH

HANSEN ALLEN & LUCE inc
ENGINEERS

HANSEN, ALLEN & LUCE DESIGN TEAM

KENT C. STAHELI, P.E. – PROJECT MANAGER/ENGINEER
GORDON L. JONES, P.E. – ENGINEER

FILE: 33 – MOULDING-WEBER CO LF\01.100 -08 WEBER CO LF\CAD\CADFILES\STATE PERMIT\G-1 STATE PERMIT COVER.DWG
FILE DATE: 1.19.2009 11:25:48 (GAH)

1/93

SURVEY NOTES

1. COORDINATES ARE BASED ON UTAH NAD83 STATE PLANE NORTH ZONE, MODIFIED TO LOCAL PROJECT ELEVATION DATUM WITH A COORDINATE CONVERSION FACTOR OF 0.99974352 FROM SEA LEVEL TO LOCAL PROJECT ELEVATION DATUM.
2. ELEVATIONS PROVIDED ARE BASED ON NAVD 88
3. BASIS OF BEARING FOR DESCRIPTIONS

   THE CONTROL USED TO ESTABLISH THE PROPERTY LINES WAS THE WEBER COUNTY SECTION CORNER MONUMENTATION SURROUNDING SECTION 19, T6N, R3W, SLB&M. THE BASIS OF BEARING IS THE NORTH LINE OF THE NORTH HALF OF SAID SECTION WHICH BEARS SOUTH 89°23'44" EAST (WEBER COUNTY GRID BEARING).

PROPERTY DESCRIPTION

ALL THAT PROPERTY IN THE NORTH HALF OF SECTION 19, TOWNSHIP 6 NORTH, RANGE 3 WEST, SALT LAKE BASE & MERIDIAN, IN THE STATE OF UTAH, COUNTY OF WEBER, MORE PARTICULARY DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON THE NORTH SIDE OF A 100 FOOT PERPETUAL EASEMENT, SAID POINT BEING SOUTH 425.19 FEET AND WEST 4.17 FEET FROM THE NORTHWEST CORNER OF SAID SECTION, BASIS OF BEARING MAY BE DETERMINED LOCALLY BY A BEARING OF S89°23'44"E, BETWEEN THE NORTHWEST CORNER AND THE NORTHEAST CORNERS OF SAID SECTION; THENCE ALONG THE NORTH LINE OF SAID EASEMENT THE FOLLOWING FIVE COURSES, S89°05'20"E 12.18, AND N87°50'35"E 1450.90 FEET TO THE BEGINNING OF A CURVE CONCAVE TO THE SOUTH, WITH A RADIUS OF 868.51 FEET, THENCE EASTERLY 198.57 FEET, THROUGH A CENTRAL ANGLE OF 13°06'00", AND S79°05'14"E 485.59 FEET, TO THE BEGINNING OF A CURVE CONCAVE TO THE NORTH, WITH A RADIUS OF 768.51 FEET, THENCE EASTERLY 474.18 FEET, THROUGH A CENTRAL ANGLE OF 35°21'09"; THENCE LEAVING SAID NORTH LINE, SOUTH 1811.66 FEET, TO THE NORTHERLY RIGHT-OF-WAY OF THE SOUTHERN PACIFIC RAILROAD COMPANY; THENCE ALONG SAID RIGHT-OF-WAY THE FOLLOWING FOUR COURSES; S81°46'35"W 221.51 FEET, AND S81°42'06"W 251.02 FEET, TO THE BEGINNING OF A CURVE CONCAVE TO THE NORTH, WITH A RADIUS OF 10491.76 FEET, THENCE WESTERLY 2155.58 FEET, THROUGH A CENTRAL ANGLE OF 11°46'18", AND N89°26'02"W 1.88 FEET TO THE EASTERLY BOUNDARY OF THE USAF PROPERTY; THENCE LEAVING SAID RIGHT-OF-WAY AND ALONG SAID EASTERLY BOUNDARY THE FOLLOWING TWO COURSES, N00°33'58"E 1867.42 FEET, AND N00°35'08"E 100.78 FEET TO THE POINT OF BEGINNING.

TOGETHER WITH A PERPETUAL EASEMENT FOR ACCESS AND CONSTRUCTION OF UTILITIES, MORE PARTICULARY DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON THE NORTH SIDE OF A 100 FOOT PERPETUAL EASEMENT, SAID POINT BEING SOUTH 423.16 FEET AND EAST 2595.73 FEET FROM THE NORTHWEST CORNER OF SAID SECTION 19, BASIS OF BEARING MAY BE DETERMINED LOCALLY BY A BEARING OF S89°23'44"E, BETWEEN THE NORTHWEST CORNER AND THE NORTHEAST CORNERS OF SAID SECTION 19; THENCE ALONG THE NORTH LINE OF SAID EASEMENT THE FOLLOWING NINE COURSES; EASTERLY ALONG A CURVE, CONCAVE TO THE NORHTWEST, WITH A RADIUS OF 768.51 FEET, THENCE ALONG SAID CURVE 214.24 FEET, THROUGH A CENTRAL ANGLE OF 15°58'21", AND N49°3705"E 309.04 FEET, AND N65°33'35"E 139.61 FEET; AND S00°00'25"E 32.86 TO THE SOUTH SIDE OF A COUNTY ROAD, AND ALONG SAID SOUTH SIDE, S89°47'56"E 331.04 FEET; AND S00°14'05"W 7.51, SAID POINT ALSO BEING THE BEGINNING OF A CURVE, CONCAVE TO THE SOUTHEAST, WITH A RADIUS OF 768.51 FEET, THENCE WEST AND SOUTHWESTERLY 544.84 FEET, THROUGH A CENTRAL ANGLE OF 40°37'13", AND S49°37'05"W 169.04 FEET, TO THE BEGINNING OF A CURVE CONCAVE TO THE NORHTWEST, WITH A RADIUS OF 868.51 FEET, THENCE WESTERLY 286.61 FEET, THROUGH A CENTRAL ANGLE OF 18°54'28; THENCE NORTH 108.43 FEET TO THE POINT OF BEGINNING.

ALSO SUBJECT TO ANY AND ALL EASEMENTS, AND EXCEPTIONS AS PERTAINING TO SUBJECT PARCEL AS DESCRIBED IN DOCUMENT ENTRY #2305658 DATED NOVEMBER 20, 2007, RECORDED WITH THE WEBER COUNTY RECORDERS OFFICE.

LANDFILL FLOOR CONSTRUCTION

1. THE LANDFILL FLOOR IS TO BE CONSTRUCTED IN PHASES AS NEEDED TO PROVIDE FOR OPERATIONAL AND CAPACITY NEEDS.
2. PROPER FLOOR ELEVATIONS AND GRADES ARE TO BE CONSTRUCTED, CERTIFIED BY AN ENGINEER OR SURVEYOR LICENSED IN THE STATE OF UTAH, AND APPROVED FOR OPERATION BY THE UTAH DIVISION OF SOLID AND HAZARDOUS WASTE PRIOR TO WASTE DISPOSAL IN EACH PHASE OF CONSTRUCTION.
3. DESIGN FLOOR ELEVATIONS PROVIDED HEREIN ARE MINIMUM ELEVATIONS. ELEVATIONS MAY BE CONSTRUCTED AND CERTIFIED HIGHER THAN THE MINIMUM ELEVATIONS PROVIDED.
4. EXCAVATE AND STOCKPILE, AS MUCH AS PRACTICABLE, THE SOIL FROM EXCAVATION AREAS IN ESTABLISHING DESIGN FLOOR GRADES FOR USE AS COVER, CLOSURE, AND OTHER FILL MATERIALS.
5. ON-SITE SOILS AND INERT WASTE SUCH AS CONCRETE, MASONRY, ROCK, CLEAN SOIL, ETC. MAY BE USED AS FILL TO ESTABLISH DESIGN FLOOR ELEVATIONS.

WASTE PILE CONSTRUCTION

1. INERT TYPE WASTES IN THE FORM OF CONCRETE, MASONRY, CLEAN SOILS, ROCK, ETC. MAY BE STOCKPILED AND USED FOR COVER OVER WASTE MATERIALS AS NEEDED FOR LITTER AND VECTOR CONTROL.
2. ON-SITE SOILS AND CLEAN WASTE SOIL MATERIALS MAY BE STOCKPILED FOR LATER USE OR IMMEDIATELY USED FOR FINAL COVER MATERIALS.
3. EXTERIOR PERIMETER SLOPES ARE TO BE NO STEEPER THAN 2.5:1 (HORIZONTAL TO VERTICAL) BETWEEN BENCH LEVELS.
4. BENCHES ARE TO BE CONSTRUCTED APPROXIMATELY EVERY 50 FEET OF VERTICAL HEIGHT AND ARE TO SLOPE TOWARD THE SOUTHEAST CORNER OF THE WASTE PILE TO CONVEY STORM WATER RUN-OFF FROM THE WASTE PILE TO THE DOWN DRAIN PRESENTED ON THE DRAWINGS.
5. THE V-DITCH FORMED BY THE BENCHES SHALL BE 3 FEET DEEP AND 18 FEET WIDE. BENCHES 18 FEET WIDE PROVIDE A RESULTANT OUTER SLOPE OF 3:1 (HORIZONTAL TO VERTICAL).
6. STORM WATER RUN-OFF CONTAINMENT FROM EXPOSED WASTE MATERIALS (OTHER THAN INERT TYPE WASTES) SHALL BE PROVIDED WITHIN THE LANDFILL FOOTPRINT ABOVE THE FLOOR DESIGN GRADE WITH A MINIMUM CAPACITY OF 0.48 ACRE-FOOT PER ACRE OF EXPOSED WASTE. CONTAINMENT AREAS MAY BE ESTABLISHED WITHIN BERM SYSTEMS ON APPROVED AREAS OF THE LANDFILL FLOOR AND ON THE WASTE PILE, AND AS DEPRESSED POND AREAS ON THE WASTE PILE.
7. STORM WATER MAY BE DISCHARGED OFF-SITE FROM AREAS OF THE WASTE PILE THAT HAVE RECEIVED A CLEAN SOIL OR INERT WASTE COVER OR A FINAL CLOSURE COVER.

CLOSURE CONSTRUCTION

1. CLOSURE COVER SHALL CONSIST OF CLEAN SOIL WITH A MINIMUM THICKNESS OF 2 FEET.
2. CLOSURE COVERS SHALL ONLY BE CONSTRUCTED AFTER STATE DIVISION OF SOLID AND HAZARDOUS WASTE APPROVAL.
3. ALL CLOSURE AREAS ARE TO BE CERTIFIED BY THE OWNER AND OPERATOR OF THE LANDFILL FOR COVER THICKNESS, PROPER STORM WATER CONTROLS, AND EROSION PROTECTION.
4. EROSION CONTROL MAY BE IN THE FORM OF VEGETATION (GENERALLY RANGE GRASSES AND BRUSH THAT ARE ADAPTABLE TO THE AREA) AND/OR STONE MULCH.

STORM WATER MANAGEMENT

1. THE STORM WATER DETENTION POND ASSOCIATED WITH THE OPERATIONS AREA SHALL BE CONSTRUCTED DURING CONSTRUCTION OF THE ACCESS ROAD AND OPERATIONS AREA. DISCHARGE FROM THIS POND MAY BE ONTO EXISTING GROUND SURFACES UNTIL THE UPPER EAST POND AND THE SOUTHEAST POND BECOME NECESSARY FOR STORM WATER MANAGEMENT.
2. THE UPPER EAST POND AND SOUTHEAST POND SHALL BOTH BE CONSTRUCTED BEFORE THE LANDFILL FOOTPRINT AND WASTE PILE HAVE REACHED THE EAST SIDE OF THE LANDFILL FOOTPRINT AREA.
3. LITTLE MOUNTAIN STORM WATER CONVEYANCE DITCH SHALL BE CONSTRUCTED BEFORE THE LANDFILL AND WASTE PILE FOOTPRINT EXTEND TO THE FIRST CULVERT UNDER THE IMPROVED ROAD THAT IS EAST OF THE PROPERTY'S NORTHWEST CORNER.
4. THE CULVERT FOR THE LITTLE MOUNTAIN STORM WATER CONVEYANCE DITCH SHALL BE CONSTRUCTED UNDER THE ACCESS ROAD AT THE TIME THE ACCESS ROAD IS CONSTRUCTED.

SECTION & DETAIL IDENTIFICATION

SECTION IDENTIFICATION

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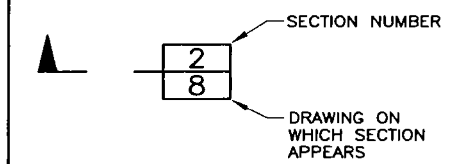
ON DRAWING NO. 6 THIS SECTION IS REFERENCED AS:



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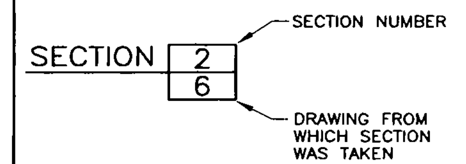

DETAIL IDENTIFICATION

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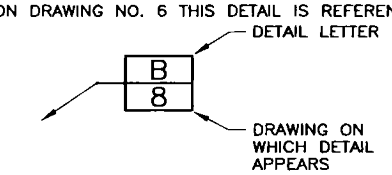

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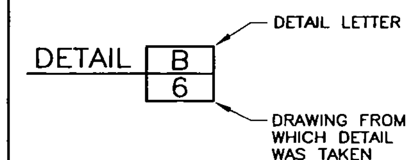


NOTES:
1. IF SECTION AND DETAILS ARE SHOWN ON THE SAME DRAWING AS SECTION CUTS AND SECTION OR DETAIL CALL-OUTS DRAWING NUMBER IS REPLACED BY A LINE.
2. DETAIL LETTERS "I" AND "O" NOT USED.

TABLE OF ABBREVIATIONS

AVG	AVERAGE	OZ.	OUNCE
℄	CENTER LINE	N.T.S.	NOT TO SCALE
CPE	CORRUGATED POLYETHYLENE	PCPE	PERFORATED CORRUGATED POLYETHYLENE PIPE
CONT.	CONTINUOUS	R.O.W.	RIGHT OF WAY
DIA.	DIAMETER	S=	SLOPE EQUALS
DIAG.	DIAGONAL	SDR	STANDARD DIMENSION RATIO
EL.	ELEVATION	STA.	STATION
E.W.	EACH WAY	TYP.	TYPICAL
FL	FLOW LINE	UDOT	UTAH DEPARTMENT OF TRANSPORTATION
HDPE	HIGH DENSITY POLYETHYLENE	YR	YEAR
HR	HOUR		
ID	INSIDE DIAMETER		
INV EL.	INVERT ELEVATION		
MAX.	MAXIMUM		
MIL.	MILLIMETER		
MIN.	MINIMUM		
O.C.	ON CENTER		

PROFESSIONAL ENGINEER No. 169141-2202 KENT C. STAHELI STATE OF UTAH

PROJECT ENGINEER

DESIGNED	KCS	3					
DRAFTED	CAH	2					
CHECKED	KCS	1					
DATE	JANUARY 2009	NO.	DATE	REVISIONS	BY	APVD.	

SCALE AS SHOWN

WEBER COUNTY

CLASS IVb C&D LANDFILL PERMIT
GENERAL
GENERAL NOTES

SHEET G-2
333.01.100

N
0 150 300
SCALE IN FEET

LEGEND

INTERPOLATED GROUNDWATER CONTOURS BASED ON GROUNDWATER MEASUREMENTS IN BORINGS AND TEST PITS

EXTRAPOLATED GROUNDWATER CONTOURS

B-# (BORING LOCATION)

B-# (BORING HIT REFUSAL)

TP-# (TEST PIT LOCATION)

NOTE:
EXTRAPOLATED GROUNDWATER CONTOURS ARE PROVIDED ALONG THE NORTH AND WEST SIDES OF THE PROPERTY BECAUSE OF REFUSAL FROM ROCK IN THESE AREAS FOR ADDITIONAL BORINGS.

FILE 333 - MOULDING-WEBER CO LF\01.100 -08 WEBER CO LF\CAD\CADFILES\STATE PERMIT\GW-1 PERMIT GW CONTOURS.DWG
FILE DATE 1.19.2009 12:07:34 (CAH)

HANSEN ALLEN & LUCE INC ENGINEERS

PROFESSIONAL ENGINEER No. 169141-2202 KENT C. STAHELI STATE OF UTAH
PROJECT ENGINEER

DESIGNED KCS	3				
DRAFTED CAH	2				
CHECKED KCS	1				
DATE JANUARY 2009	NO.	DATE	REVISIONS	BY	APVD.

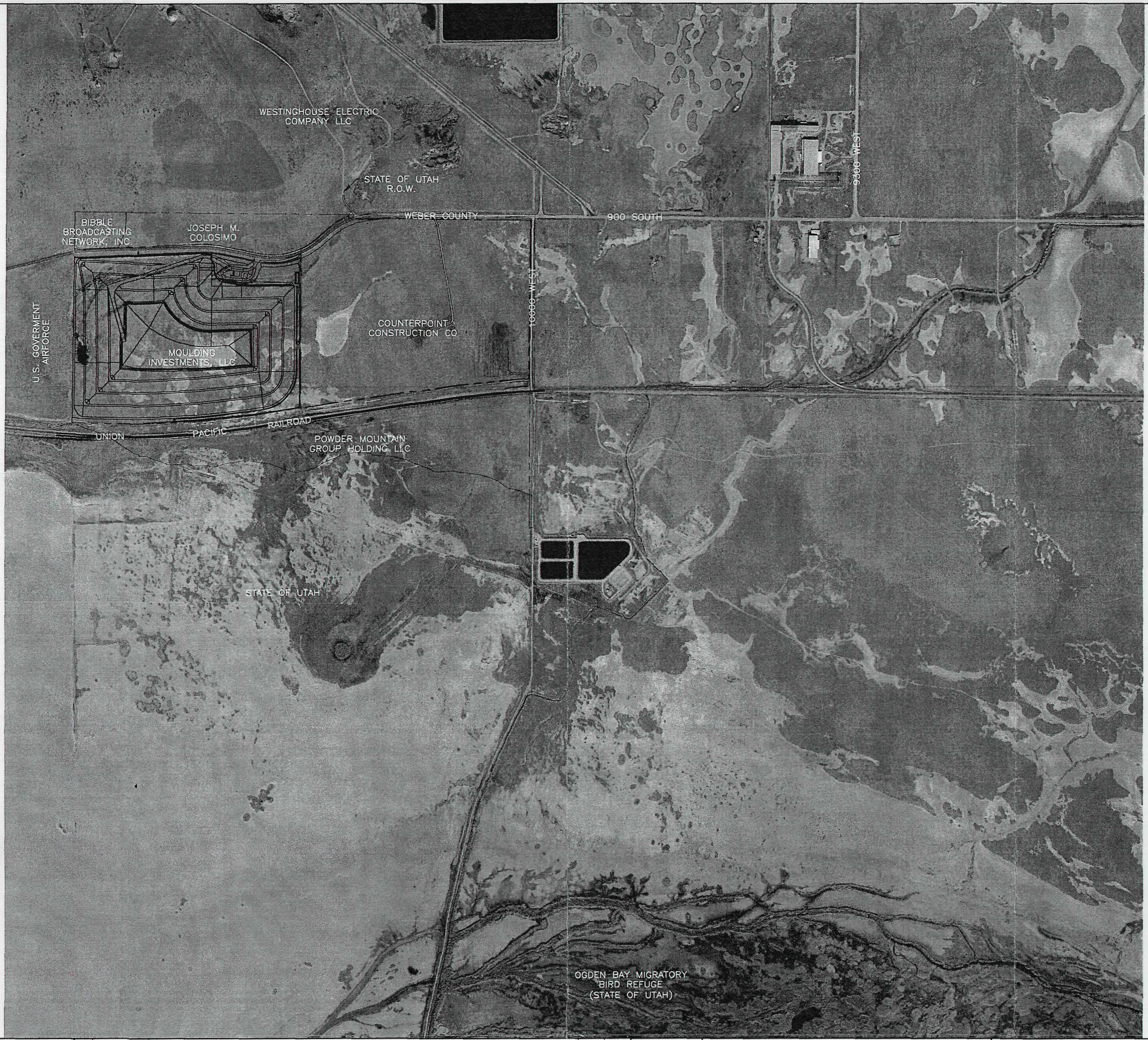
SCALE

WEBER COUNTY

CLASS IVb C&D LANDFILL PERMIT
GROUND WATER
GROUND WATER CONTOURS

SHEET
GW-1
333.01.100

10/07



N

0 600 1200

SCALE IN FEET

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10/07

HANSEN ALLEN & LUCE INC ENGINEERS

PROFESSIONAL ENGINEER No. 169141-2202 KENT C. STAHELI STATE OF UTAH

PROJECT ENGINEER

DESIGNED KCS	3				
DRAFTED CAH	2				
CHECKED KCS	1				
DATE JANUARY 2009	NO.	DATE	REVISIONS	BY	APVD.

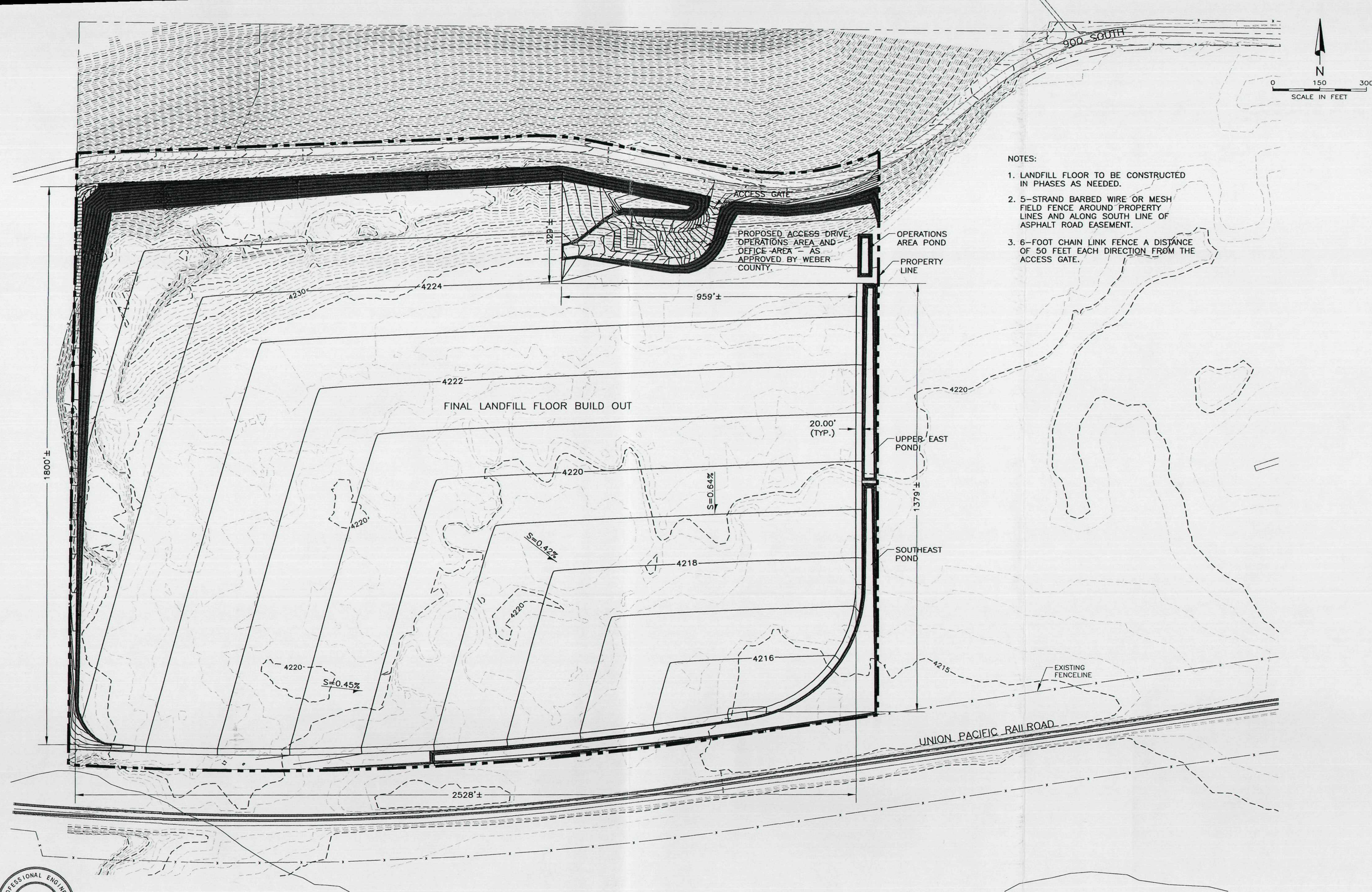
SCALE

WEBER COUNTY

CLASS IVb C&D LANDFILL PERMIT
CIVIL
VICINITY PLAN

SHEET C–1

333.01.100



NOTES:

1. LANDFILL FLOOR TO BE CONSTRUCTED IN PHASES AS NEEDED.
2. 5–STRAND BARBED WIRE OR MESH FIELD FENCE AROUND PROPERTY LINES AND ALONG SOUTH LINE OF ASPHALT ROAD EASEMENT.
3. 6–FOOT CHAIN LINK FENCE A DISTANCE OF 50 FEET EACH DIRECTION FROM THE ACCESS GATE.

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10/07

HANSEN ALLEN & LUCE INC ENGINEERS

PROFESSIONAL ENGINEER No. 169141-2202 KENT C. STANELI STATE OF UTAH

PROJECT ENGINEER

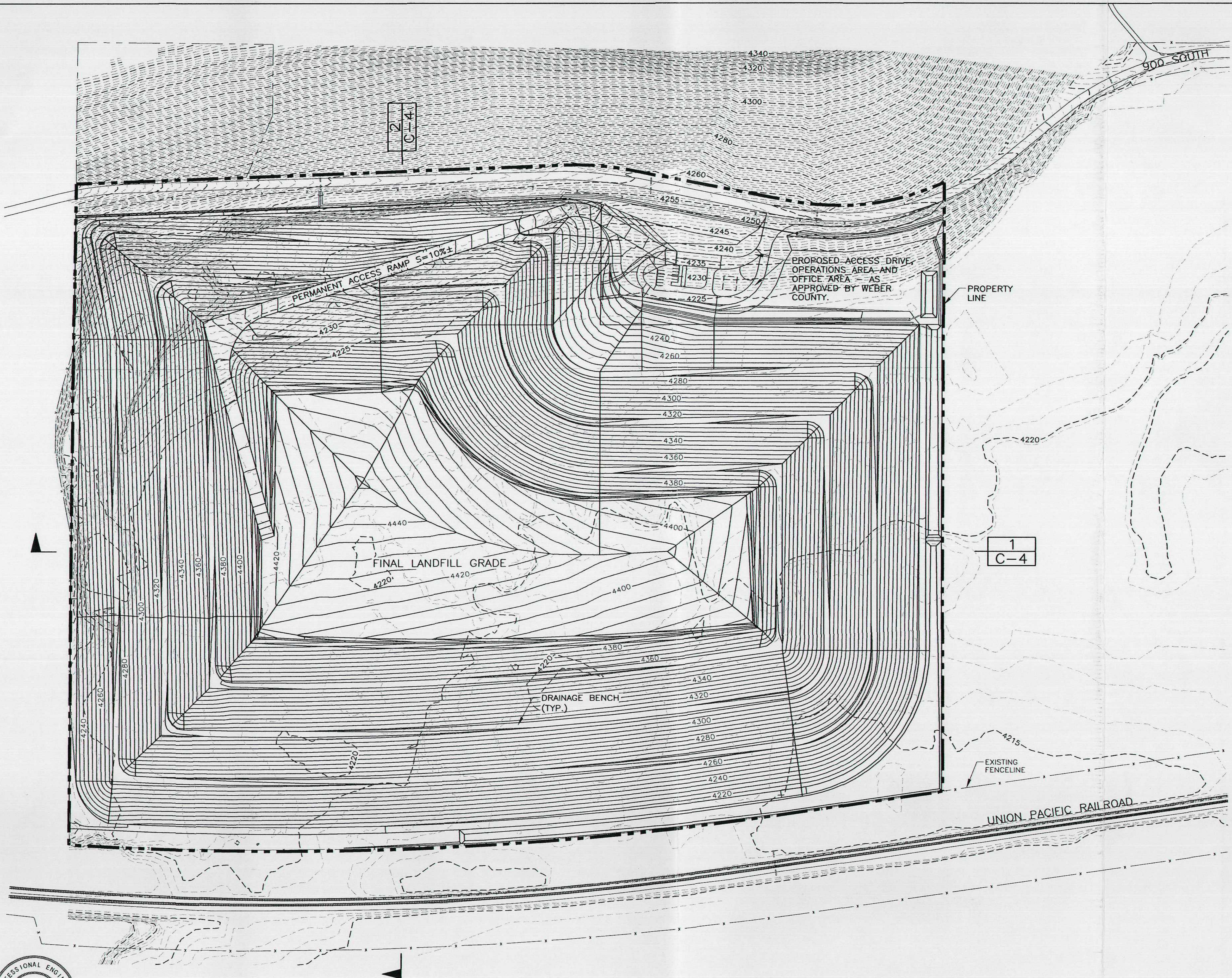
DESIGNED KCS	3				
DRAFTED CAH	2				
CHECKED KCS	1				
DATE JANUARY 2009	NO.	DATE	REVISIONS	BY	APVD.

SCALE

WEBER COUNTY

CLASS IVb C&D LANDFILL PERMIT
CIVIL
OVERALL SITE PLAN

SHEET C–2
333.01.100



N

0 150 300
SCALE IN FEET

NOTES:

1. EXISTING GROUND CONTOUR INTERVAL IS 1-FOOT.
2. CLOSURE CONTOUR INTERVAL IS 5-FEET.

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FILE DATE: 01.19.2009 12:38:26 (CAH)

HANSEN ALLEN & LUCE inc
ENGINEERS

PROFESSIONAL ENGINEER
No. 169141-2202
KENT C. STAHELI
STATE OF UTAH

PROJECT ENGINEER

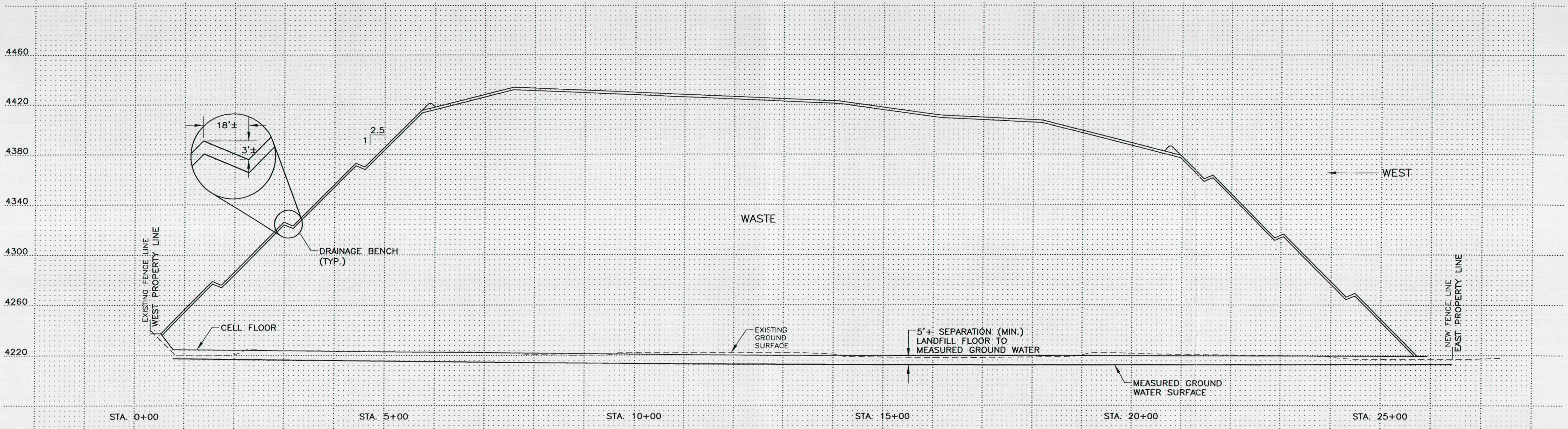
DESIGNED	KCS	3			
DRAFTED	CAH	2			
CHECKED	KCS	1			
DATE	JANUARY 2009	NO.	DATE	REVISIONS	BY	APVD.

SCALE

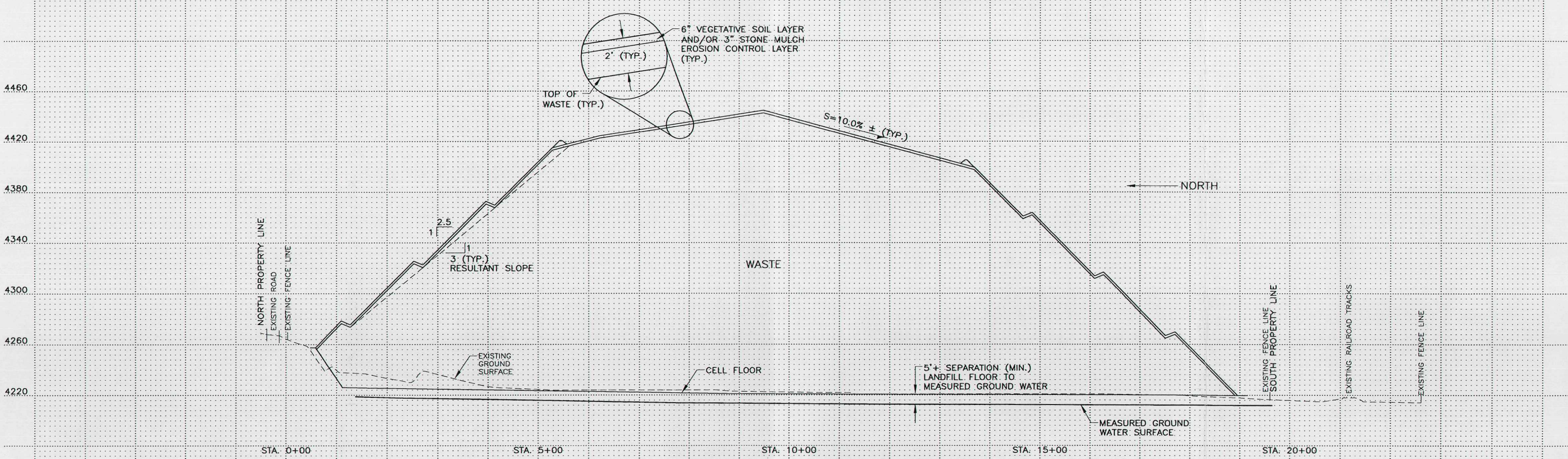
WEBER COUNTY

CLASS IVb C&D LANDFILL PERMIT
CIVIL
EXISTING & FINAL CONTOUR PLAN

SHEET
C-3
333.01.100



EAST–WEST SECTION 1 / C–3



NORTH–SOUTH SECTION 2 / C–3

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FILE DA...19.2009 12:41:01 (CAH)

HANSEN ALLEN & LUCE inc ENGINEERS

PROFESSIONAL ENGINEER No. 169141-2202 KENT C. STAHELI STATE OF UTAH

PROJECT ENGINEER

DESIGNED KCS	3					
DRAFTED CAH	2					
CHECKED KCS	1					
DATE JANUARY 2009	NO.	DATE	REVISIONS	BY	APVD.	SCALE

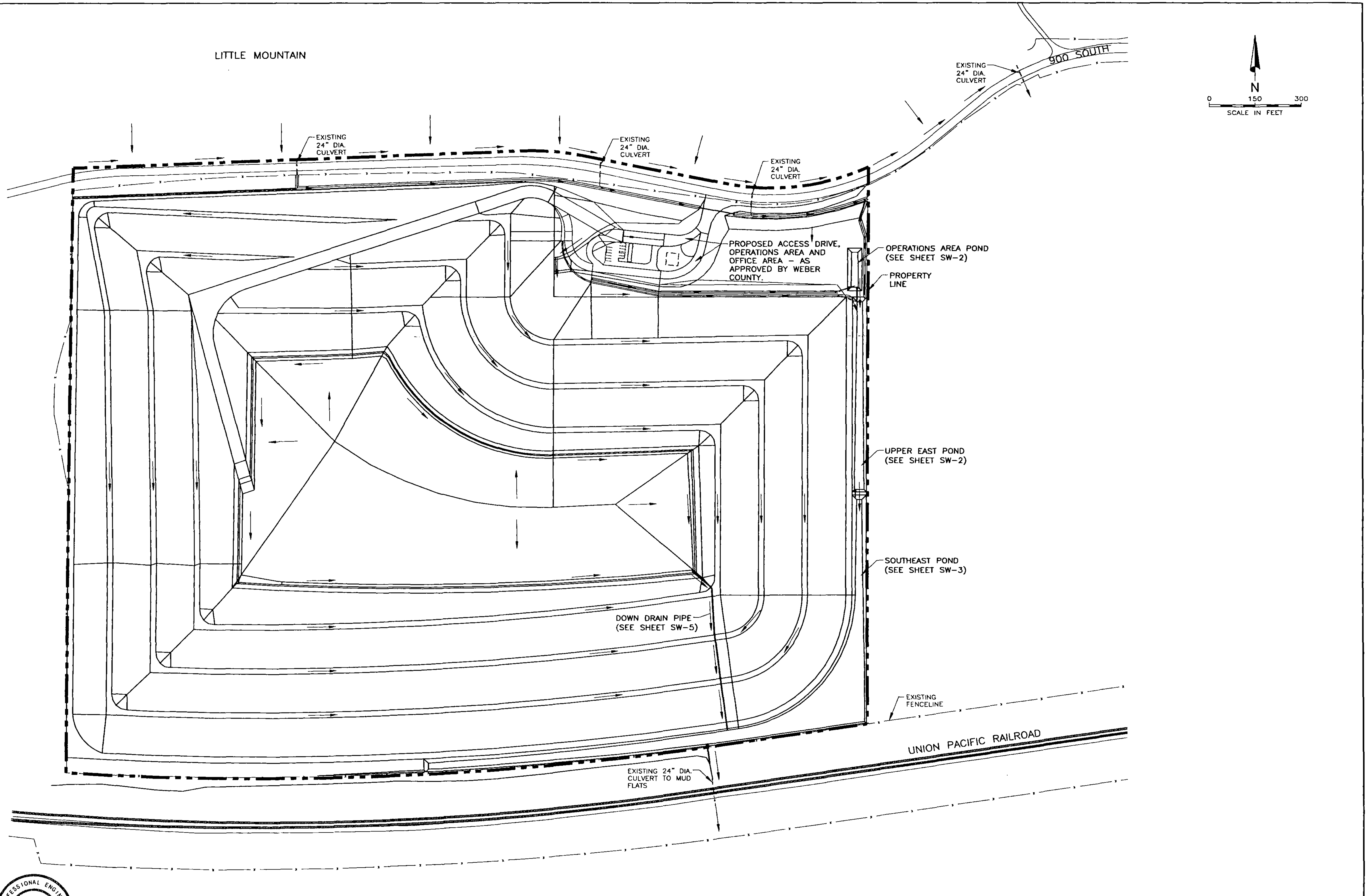
WEBER COUNTY

CLASS IVb C&D LANDFILL PERMIT
CIVIL
OVERALL LANDFILL SECTIONS

SHEET C–4

333.01.100

10/07



FILE NAME: 333 - MOULDING-WEBER CO LF\01.100 -08 WEBER CO LF\CAD\CADFILES\STATE PERMIT\SW-1 SUBMIT FINAL GRADING PLAN.DWG
FILE DATE: 1.19.2009 12:44:19 (CAH)

HANSEN ALLEN & LUCE INC ENGINEERS

PROFESSIONAL ENGINEER No. 159141-2202 KENT C. STAHELI STATE OF UTAH

PROJECT ENGINEER

DESIGNED KCS	3				
DRAFTED CAH	2				
CHECKED KCS	1				
DATE JANUARY 2009	NO.	DATE	REVISIONS	BY	APVD.

SCALE

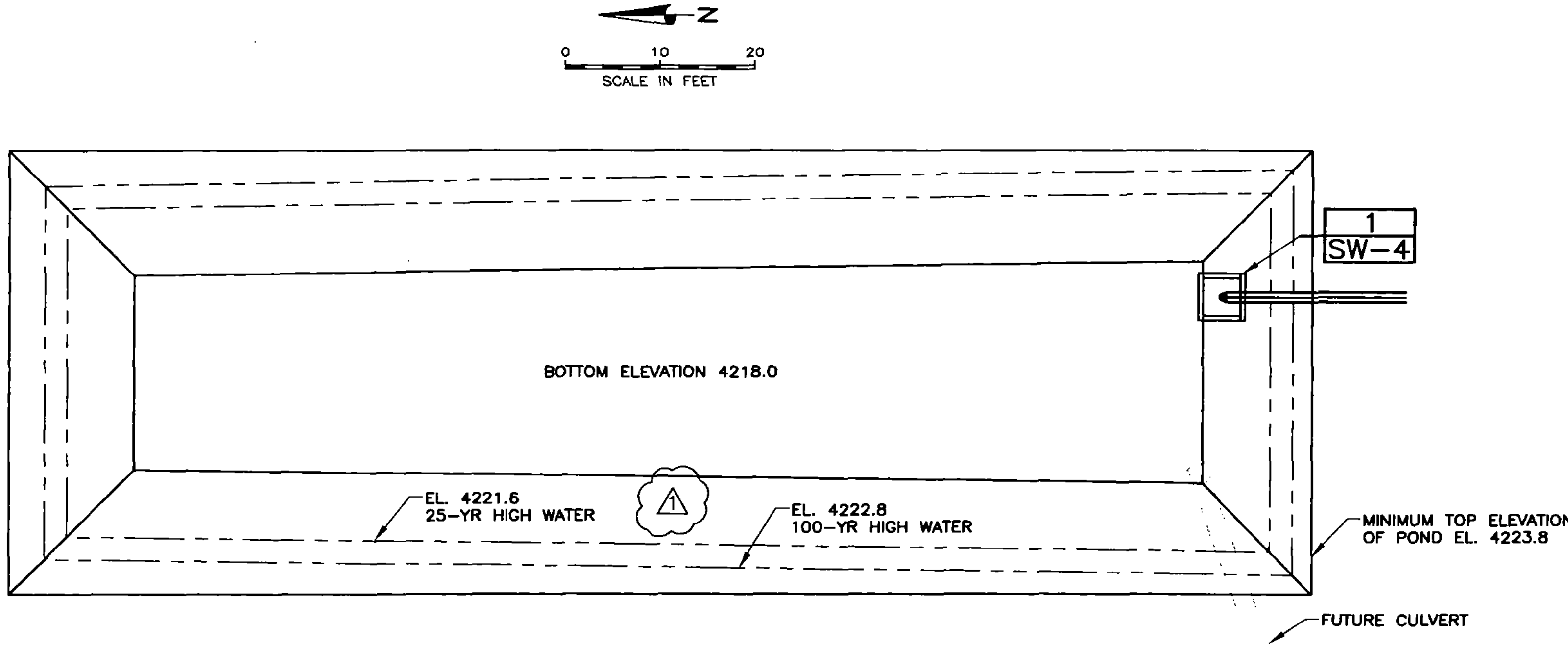
WEBER COUNTY

CLASS IVb C&D LANDFILL PERMIT
STORM WATER
FINAL SITE GRADING & DRAINAGE PLAN

SHEET SW-1

333.01.100

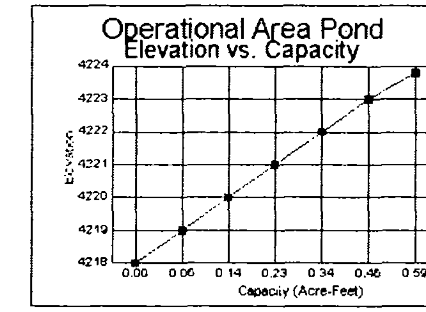
10/07



OPERATIONS AREA POND

Operations Area Pond

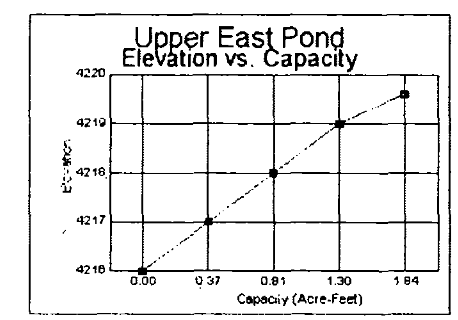
Elevation	Area (sf)	Avg. Area (sf)	Volume (cf)	Volume (ac-ft)
4218	2502		0	0.00
4219	3060	2781	2781	0.06
4220	3651	3356	6137	0.14
4221	4273	3962	10099	0.23
4222	4927	4600	14699	0.34
4223	5613	5270	19969	0.46
4223.8	6193	5903	25872	0.59



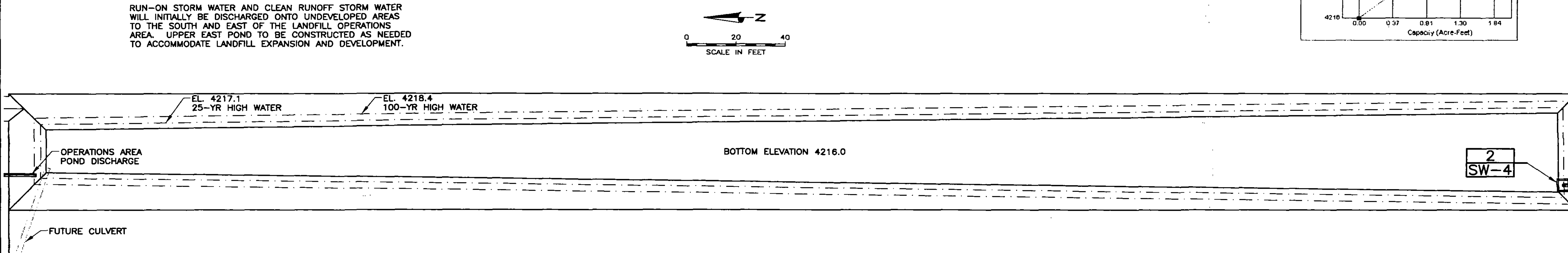
NOTE:
DISCHARGE WILL INITIALLY BE ONTO THE UNDEVELOPED AREA EAST OF THE LANDFILL OPERATIONS AREA. WHEN THE UPPER EAST POND IS CONSTRUCTED, DISCHARGE WILL BE INTO THE UPPER EAST POND.

Upper East Pond

Elevation	Area (sf)	Avg. Area (sf)	Volume (cf)	Volume (ac-ft)
4216	15047		0	0.00
4217	17583	16315	16315	0.37
4218	20150	18867	35182	0.81
4219	22749	21450	56631	1.30
4219.6	24353	23551	80182	1.84



NOTE:
RUN-ON STORM WATER AND CLEAN RUNOFF STORM WATER WILL INITIALLY BE DISCHARGED ONTO UNDEVELOPED AREAS TO THE SOUTH AND EAST OF THE LANDFILL OPERATIONS AREA. UPPER EAST POND TO BE CONSTRUCTED AS NEEDED TO ACCOMMODATE LANDFILL EXPANSION AND DEVELOPMENT.



UPPER EAST POND

HANSEN ALLEN & LUCE INC ENGINEERS	DESIGNED KCS	3				
	DRAFTED CAH	2				
	CHECKED KCS	⚠	06/08-09	REVISED 100-YR & 25-YR LEADER LINES	CAH	KCS
PROJECT ENGINEER	DATE JANUARY 2009	NO.	DATE	REVISIONS	BY	APVD.

SCALE

WEBER COUNTY

CLASS IVb C&D LANDFILL PERMIT
STORM WATER
OPERATIONS AREA & EAST UPPER PONDS

SHEET SW-2

333.01.100

FILE NAME: MOULDING-WEBER CO LF\01.100 -08 WEBER CO LF\CAD\CADFILES\STATE PERMIT\SW-2 ST OPS-UPPER PONDS__R1.DWG
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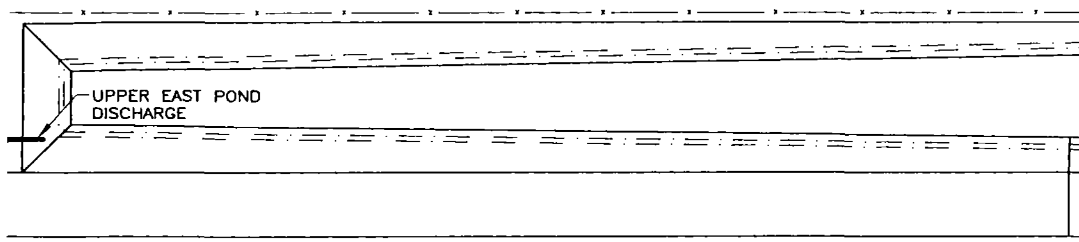
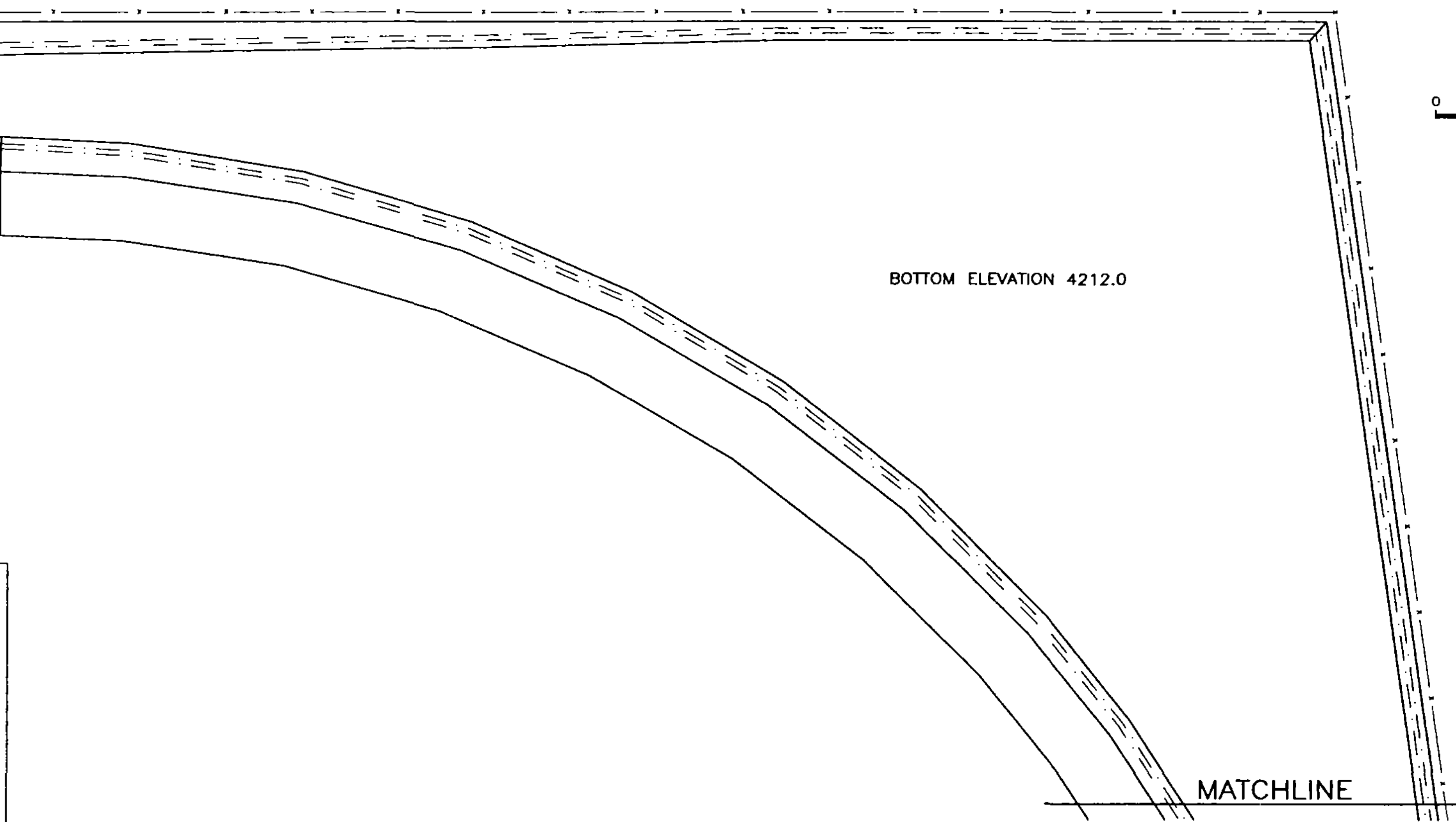
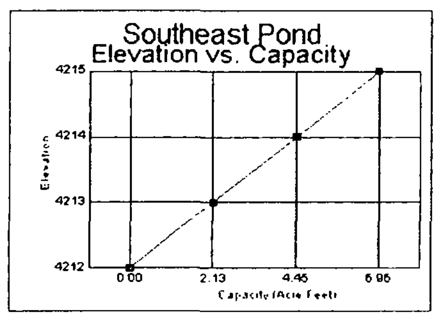
10/07



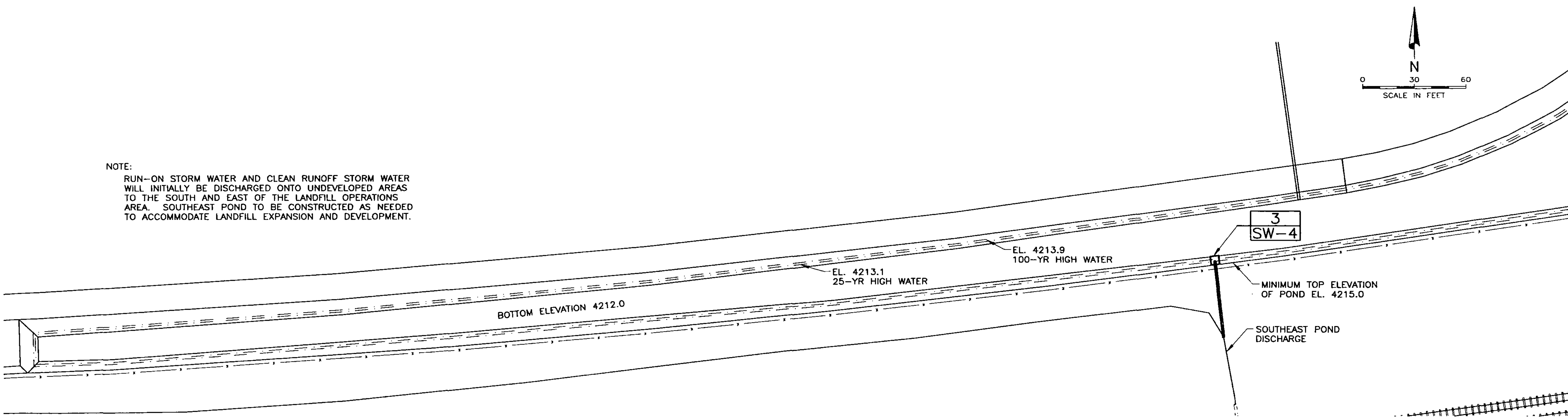


Southeast Pond

Elevation	Area (sf)	Avg. Area (sf)	Volume (cf)	Volume (ac-ft)
4212	88572		0	0.00
4213	96908	92740	92740	2.13
4214	105276	101092	193832	4.45
4215	113677	109477	303309	6.96



NOTE:
RUN-ON STORM WATER AND CLEAN RUNOFF STORM WATER WILL INITIALLY BE DISCHARGED ONTO UNDEVELOPED AREAS TO THE SOUTH AND EAST OF THE LANDFILL OPERATIONS AREA. SOUTHEAST POND TO BE CONSTRUCTED AS NEEDED TO ACCOMMODATE LANDFILL EXPANSION AND DEVELOPMENT.



SOUTHEAST POND

HANSEN ALLEN & LUCE inc ENGINEERS

PROFESSIONAL ENGINEER No 169141-2202 KENT C. STAHELI STATE OF UTAH

PROJECT ENGINEER

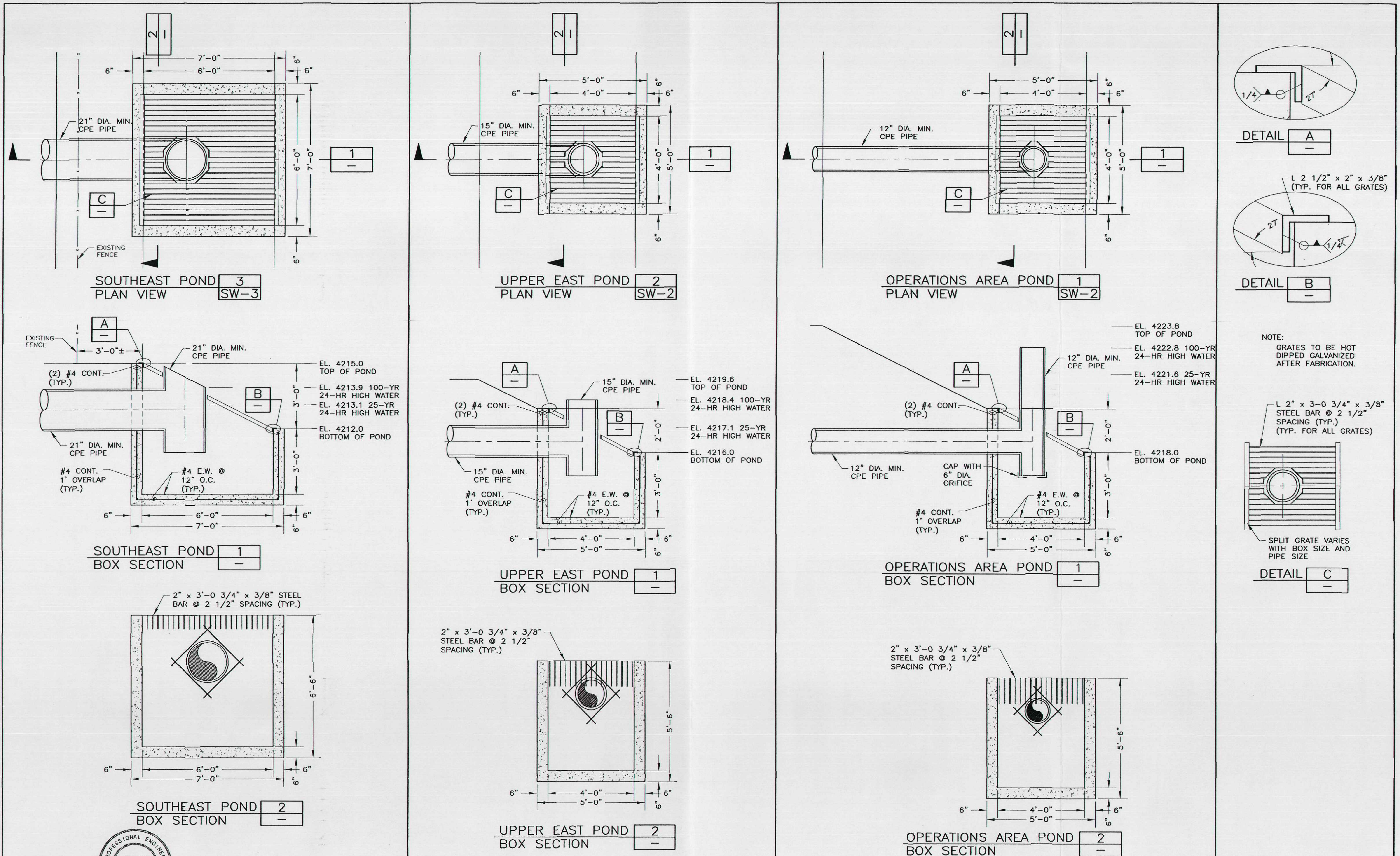
DESIGNED KCS	3				
DRAFTED CAH	2				
CHECKED KCS	1				
DATE JANUARY 2009	NO.	DATE	REVISIONS	BY	APVD.

SCALE

WEBER COUNTY

CLASS IVb C&D LANDFILL PERMIT
STORM WATER
SOUTHEAST POND

SHEET
SW-3
333.01.100



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HANSEN ALLEN & LUCE INC ENGINEERS

PROFESSIONAL ENGINEER No. 169141-2202 KENT C. STAHELI STATE OF UTAH
PROJECT ENGINEER

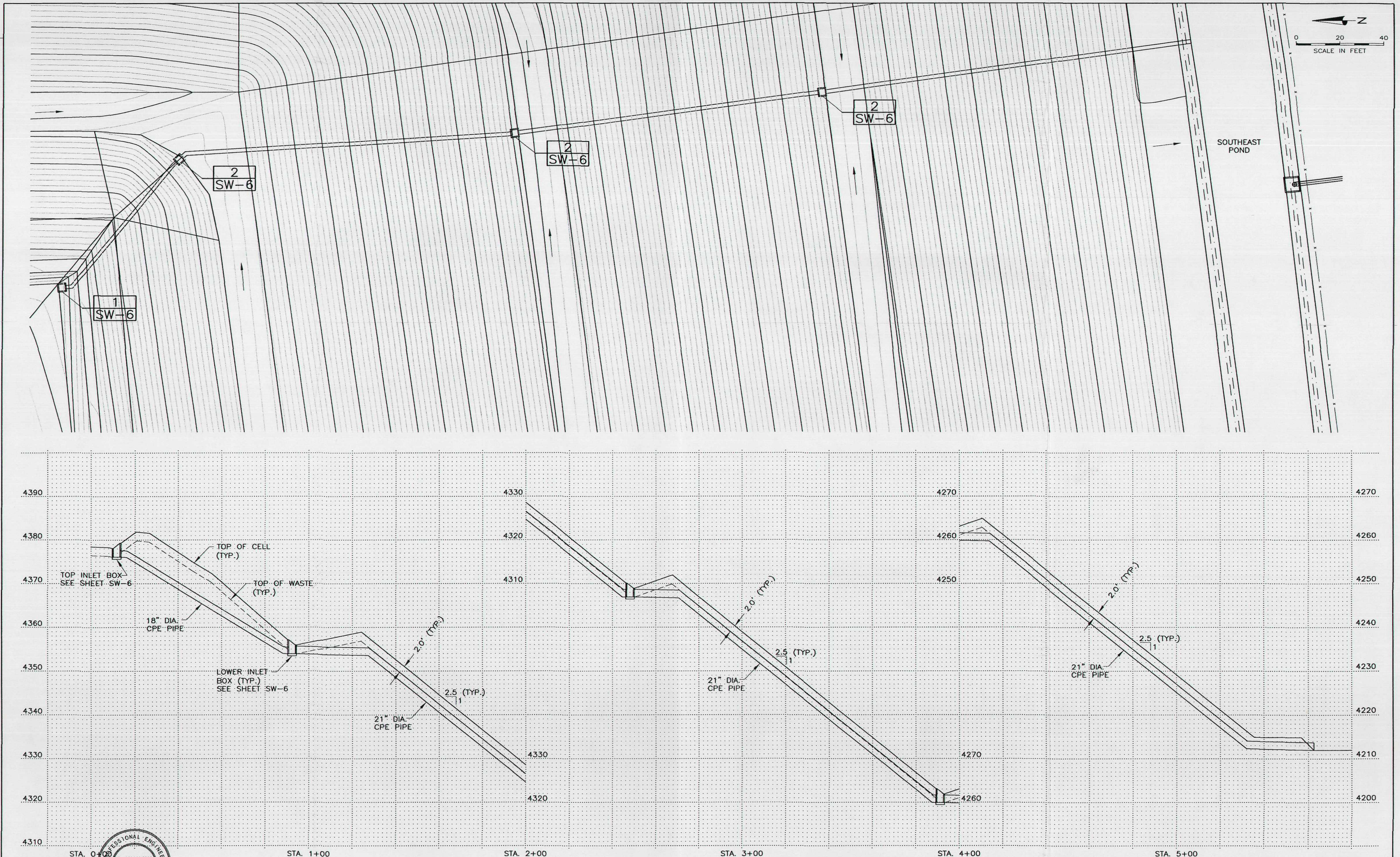
DESIGNED KCS	3				
DRAFTED CAH	2				
CHECKED KCS	1				
DATE JANUARY 2009	NO.	DATE	REVISIONS	BY	APVD.

SCALE

WEBER COUNTY

CLASS IVb C&D LANDFILL PERMIT
STORM WATER
POND OUTLET DETAILS

SHEET SW-4
333.01.100



FILE NAME: 333 - MOULDING-WEBER CO LF\01.100 -08 WEBER CO LF\CAD\CADFILES\STATE PERMIT\SW-5 S...RMIT DOWN DRAIN P&P.DWG
FILE DATE: 1.19.2009 13:07:07 (CAH)

HANSEN ALLEN & LUCE INC ENGINEERS

PROFESSIONAL ENGINEER No. 169141-2202 KENT C. STAHELI STATE OF UTAH

PROJECT ENGINEER

DESIGNED	KCS	3				
DRAFTED	CAH	2				
CHECKED	KCS	1				
DATE	JANUARY 2009	NO.	DATE	REVISIONS	BY	APVD.

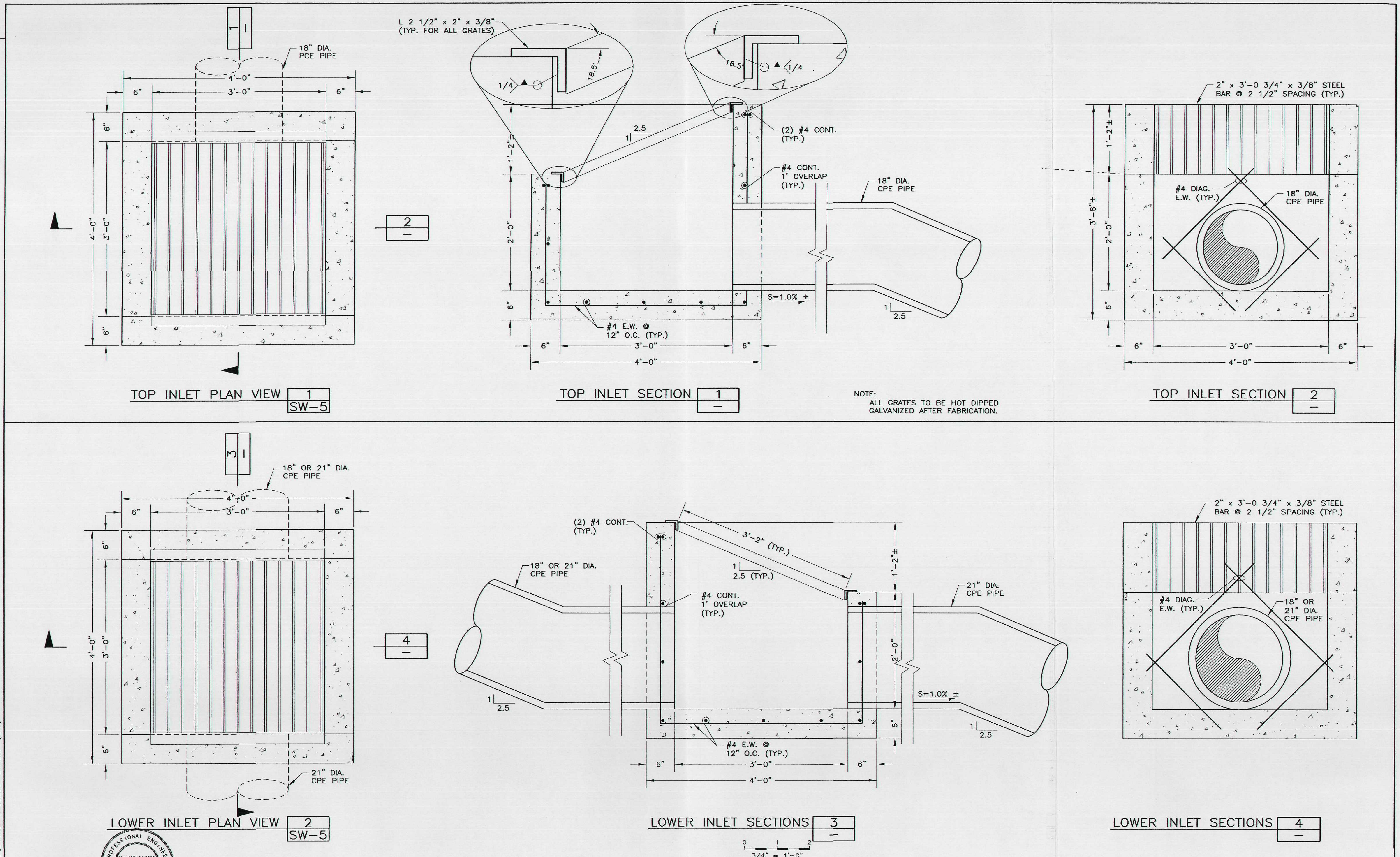
SCALE AS SHOWN

WEBER COUNTY

CLASS IVb C&D LANDFILL PERMIT
STORM WATER
CLOSURE DOWN DRAIN PLAN & PROFILE

SHEET SW-5
333.01.100

10/07



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FILE DATE: 1.19.2009 13:11:03 (CAH)

HANSEN ALLEN & LUCE inc ENGINEERS

PROFESSIONAL ENGINEER No. 169141-2202 KENT C. STAHELI STATE OF UTAH

PROJECT ENGINEER

DESIGNED KCS	3				
DRAFTED CAH	2				
CHECKED KCS	1				
DATE JANUARY 2009	NO.	DATE	REVISIONS	BY	APVD.

SCALE

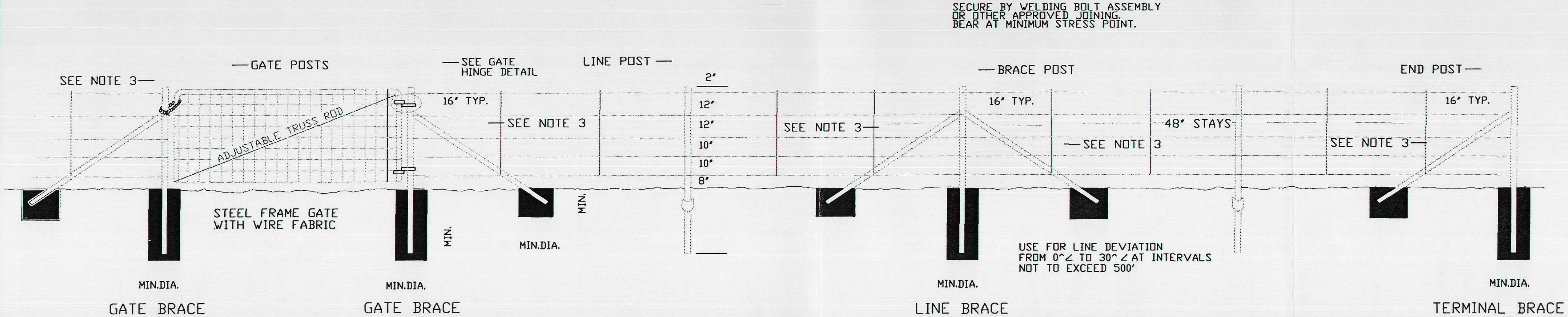
WEBER COUNTY

CLASS IVb C&D LANDFILL PERMIT
STORM WATER
CLOSURE DOWN DRAIN INLET DETAILS

SHEET SW-6

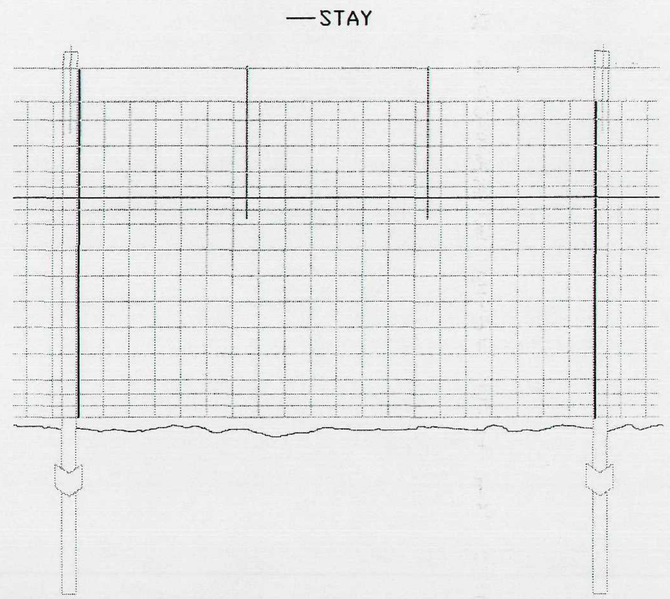
333.01.100

10/07



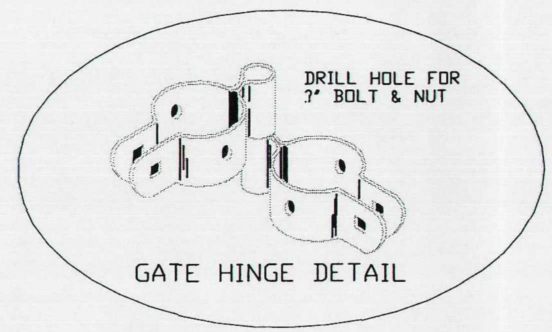
INSTALLATION WITH METAL POSTS

(TYPICAL)



RIGHT OF WAY FENCE TYPE G (DEER BARRIER)

FOR FENCETYPES A, B, D, E AND F
POST SIZE, SPACING AND BRACING ARE
AS SHOWN IN TYPICAL INSTALLATION
ABOVE. SPACE 2 STAYS EVENLY
BETWEEN EACH SET OF POSTS.



NOTES:

1. SET METAL POSTS IN CLASS 'B' CONCRETE.

2. LINE POSTS FOR TYPE A,B,D,,E & F FENCE
   A-TEE CHANNELS OR 'Y' OR 'U' SECTIONS, MINIMUM WEIGHT 1.33 lb/ft. ON LENGTH.
   B-STEEL PIPES,1.900" OUTSIDE DIAMETER SCHEDULE 40 PIPE, WEIGHT 2.72 lb/ft OF LENGTH OR HIGH TENSILE TRIPLE COATED STEEL PIPE, WEIGHT 2.23 lb/ft OF LENGTH.
   C-ALTERNATE LINE POSTS APPROVED BY THE ENGINEER TO HAVE A MINIMUM RESISTING SECTION MODULUS OF 0.32"^{3} PERPENDICULAR AND 0.12"^{3} PARALLEL TO THE FENCE LINE. ANCHOR PLATES TO POSTS, MINIMUM SURFACE AREA OF 20"^{2}, MINIMUM 18 GAUGE THICKNESS AND MINIMUM WEIGHT 0.67 lb/EACH

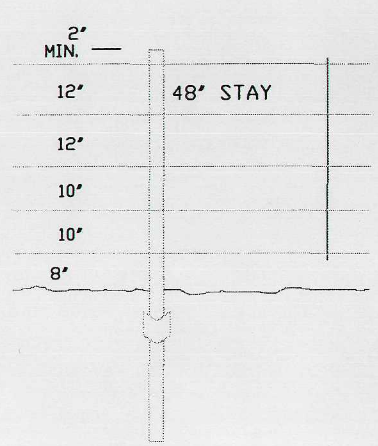
3. BRACE AND CORNER PSTS (ASTM A 36)
   A-BRACE AND CORNER POSTS FOR TYPE A,B,D,E & F FENCES USE 2?"x 2?"x ?" ANGLES, MINIMUM WEIGHT 4.10 lb/ft.
   B-BRACES FOR TYPE A,B,D,E& F FENCES, USE 2"x 2" x ?" ANGLES, MINIMUM WEIGHT 3.19 lb/ft.
   C-TYPE G: PIPE FOR CORNER AND BRACE POSTS, USE 2.375" OUTSIDE DIAMETER, WEIGHT 3.65 lb/ft. OR HIGH TENSILE TRIPLE COATED STEEL, 2.375" OUTSIDE DIAMETER WEIGHT 3.11 lb/ft.

4. LINE POSTS FOR TYPE A,B,D,E & F FENCE: 7'-0" LENGTH
   LINE POSTS FOR TYPE G FENCE: 10'-0"

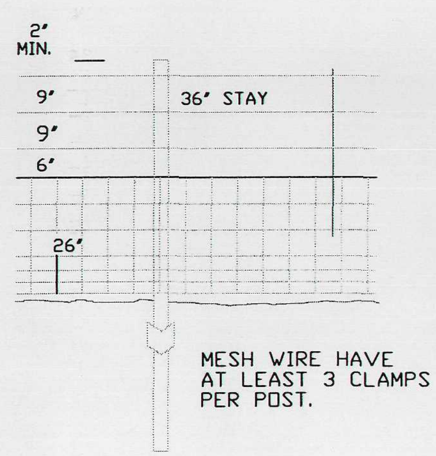
5. TERMINATE MESH AND BARBER WIRE AT EACH CORNER POST.

6. USE CORNER POST BRACES ON ALL FENCE LINE DEVIATIONS GREATER THAN 30^. USE CORNER POST BRACES ON TYPE G FENCE WITH DEVIATIONS GREATER THAN 15^.

7. GALVANIZE METAL PER (ASTM A 702) OR PAINTED (ASTM A 123)

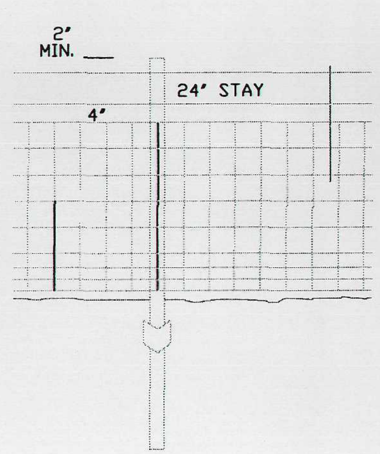


TYPE A

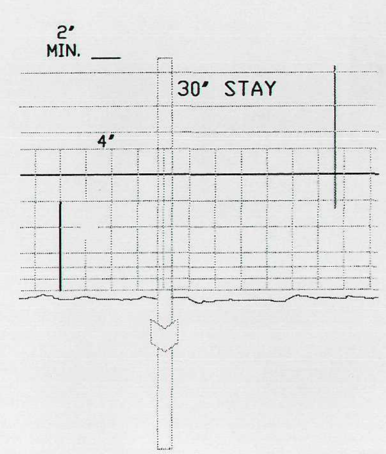


MESH WIRE HAVE
AT LEAST 3 CLAMPS
PER POST.

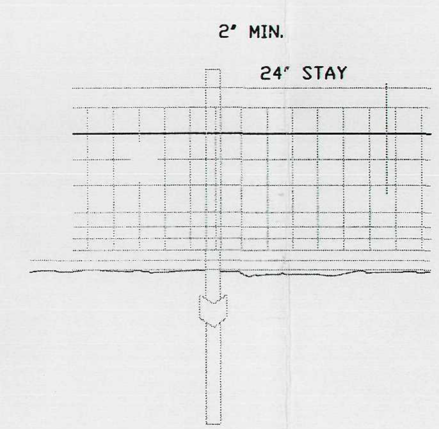
TYPE B



TYPE D



TYPE E



TYPE F

TO BE INSTALLED IN
DEER COUNTRY

NO.	DATE	APPR	REMARKS
1	04/01/04	K.V	REVISED NOTE 3C

REVISIONS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL

CHAIRMAN STANDARDS COMMITTEE APPROVED — APR.29,2004 DATE

DEPUTY DIRECTOR — APR.29,2004 DATE

RIGHT OF WAY FENCE AND GATES (METAL POST)

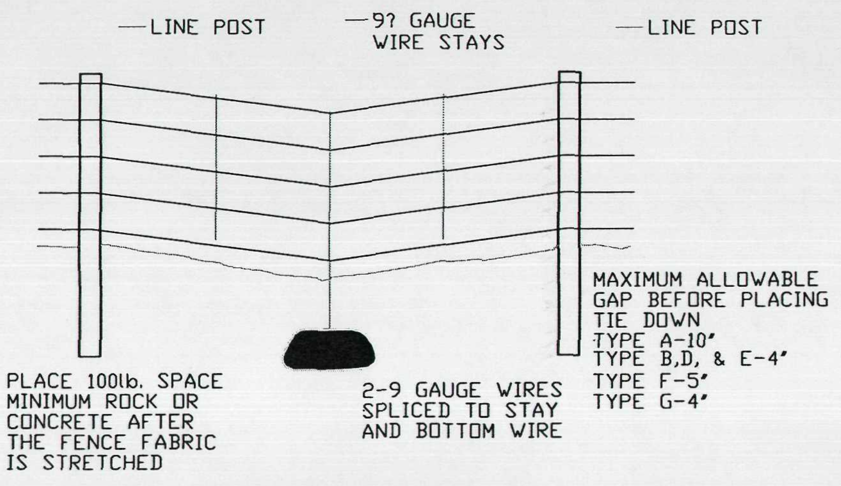
STANDARD DRAWING TITLE

STD DWG
FG 2A

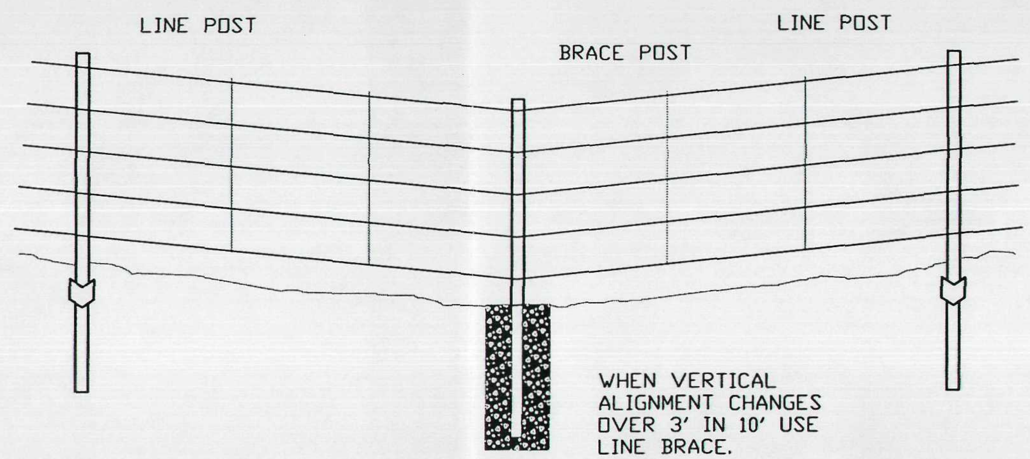
333 - MOULDING-WEBER CO LF\01.100 -08 WEBER CO LF\CAD\CADFILES\STATE PERMIT\FG02A.DWG
1.19.2009 13:15:58 (CAH)
$$date$$ $$files$$

INSTALLATION WITH METAL POSTS

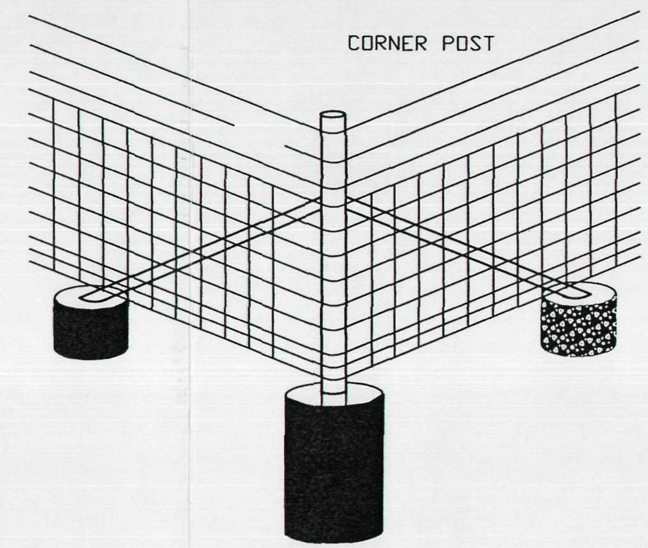
(TYPICAL)



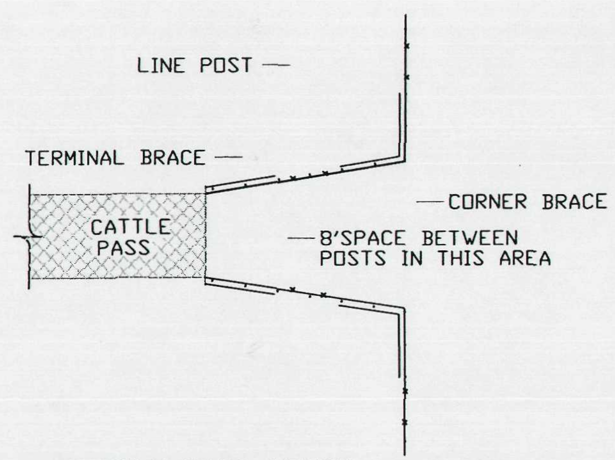
TYPICAL SAG SECTION



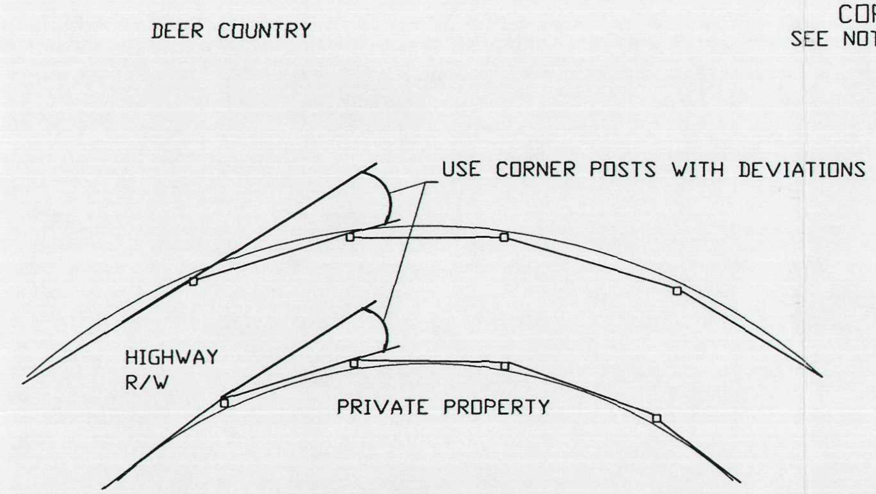
TYPICAL VERTICAL ALIGNMENT CHANGE



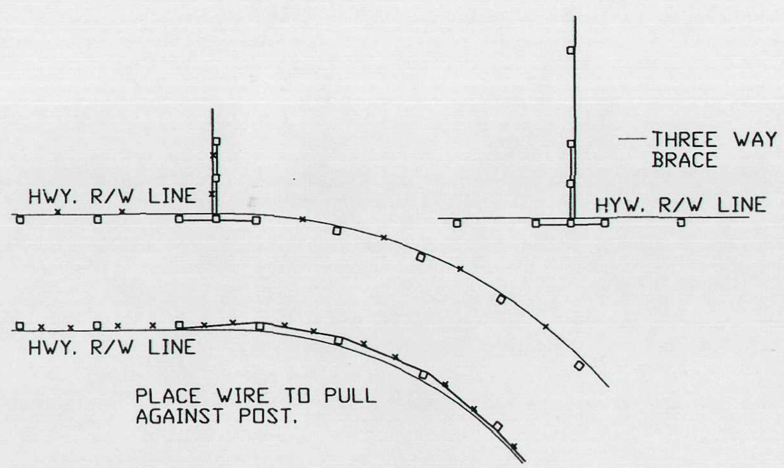
CORNER BRACE
SEE NOTE #6 STD DWG FG 2A



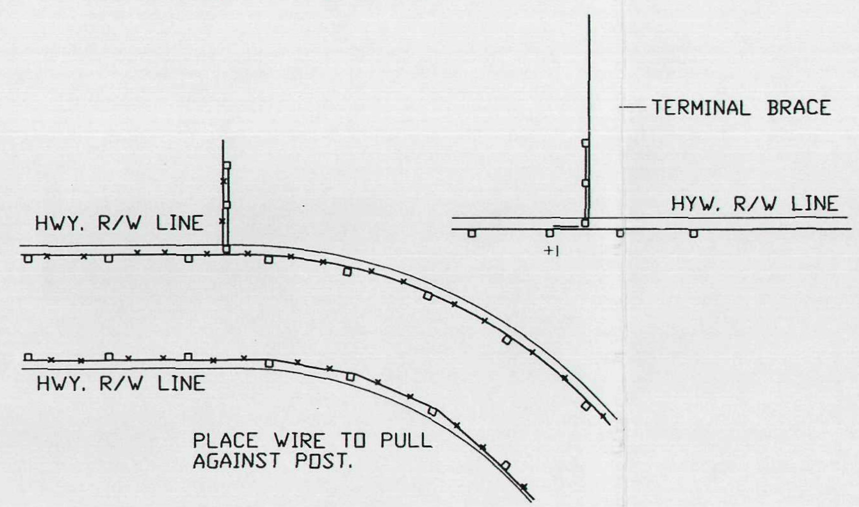
CATTLE PASS FENCE
DETAIL



DEER BARRIER ON CURVES
SEE NOTE #6 STD DWG FG 2A



POST & WIRE LOCATION



POST & WIRE LOCATION

333 - MOULDING-WEBER CO LF\01.100 -08 WEBER CO LF\CAD\CADFILES\STATE PERMIT\FG02B.DWG
1.19.2009 13:27:23 (CAH)

REVISIONS			
NO.	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL

CHAIRMAN STANDARDS COMMITTEE
APPROVED

DEPUTY DIRECTOR

RIGHT OF WAY
FENCE AND GATES
(METAL POST)

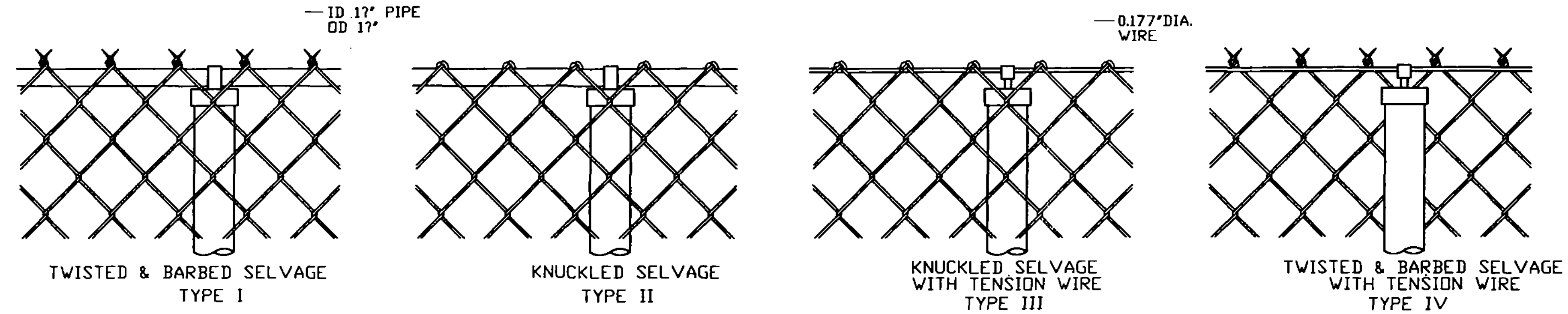
STANDARD DRAWING TITLE

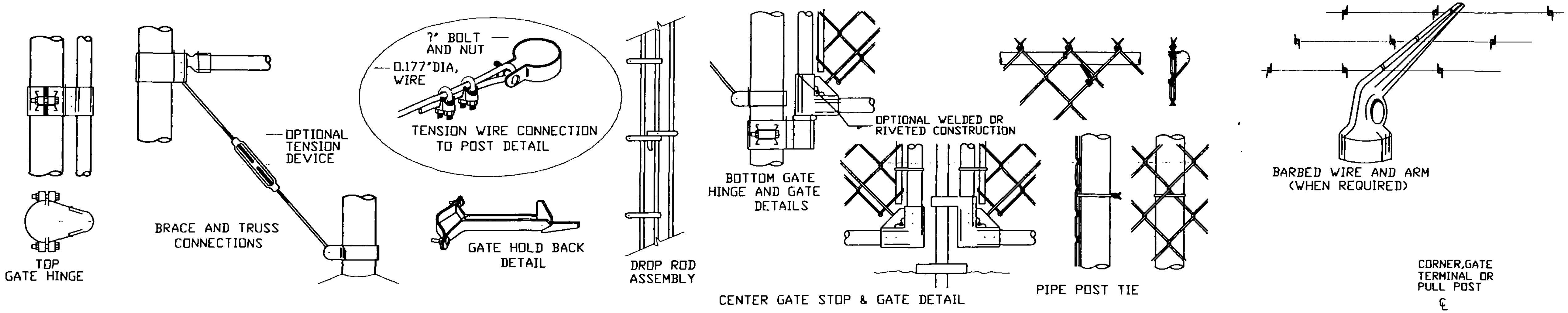
STD DWG
FG 2B

NOTES:

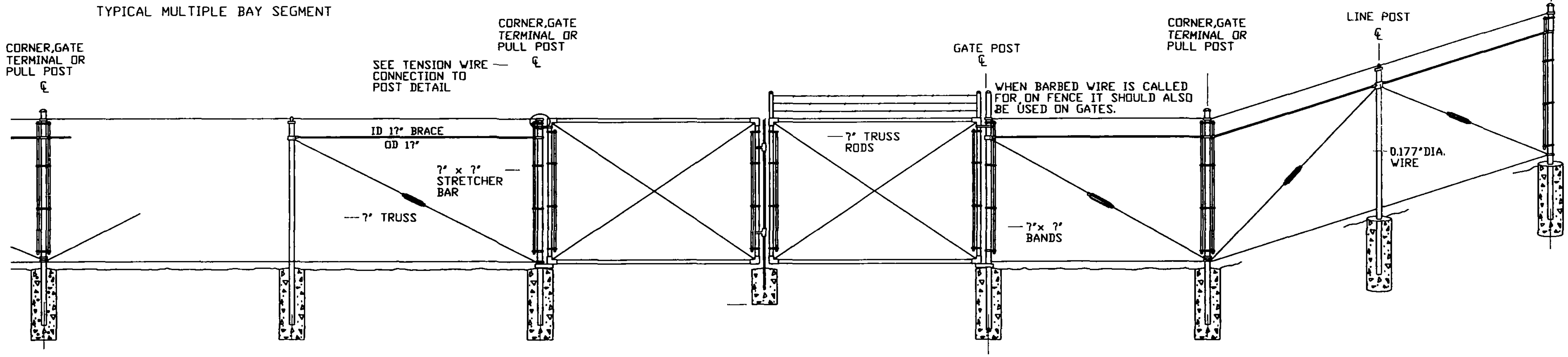
1. POSTS: SCHEDULE 40 PIPE.
   TRIPLE COATED HIGH TENSILE STEEL PIPE OR ROLL-FORMED C-SECTION OF THE SIZE SHOWN IN THE CHART AND AS DEFINED IN THE STANDARD SPECIFICATION. WEIGHT IN lb/ft WITH TOLERANCE OF 5 PERCENT. OTHER TYPES OF POSTS WITH EQUAL OR GREATER SECTION MODULUS MAY BE USED IF APPROVED, IN ADVANCE, BY THE ENGINEER.

2. FABRIC HEIGHTS LESS THAN 5':
   TRUSS RODS AND BRACES NOT REQUIRED.





TYPICAL MULTIPLE BAY SEGMENT



HEIGHT	GATE OPENING	GATE POST	GATE FRAME
UNDER 6'	SINGLE TO 6' OR DOUBLE TO 12'	2"	1"
	SINGLE OVER 6' TO 8' OR DOUBLE OVER 12' TO 16'	2?"	1?"
	SINGLE OVER 8' TO 12' OR DOUBLE 16' TO 24'	3?"	
6' AND OVER *	SINGLE TO 6' OR DOUBLE TO 12'	2?"	1?"
	SINGLE OVER 6' TO 13' OR DOUBLE OVER 12' TO 24'	3?"	
	SINGLE OVER 13' TO 18' OR DOUBLE OVER 24' TO 36'	6"	
	SINGLE OVER 18' OR DOUBLE OVER 36'	8"	

* GATES OVER 6' IN HEIGHT AND WIDER THAN 12' WILL REQUIRE 3 INDUSTRIAL PRESSED STEEL HINGES.

HEIGHT OF FABRIC	DEPTH OF POSTS	LENGTH OF END CORNER OR PULL POSTS	LENGTH OF LINE POSTS	SIZE OF POSTS									
				END, CORNER & PULL POSTS				LINE POST MIN.SIZE					
				NOM. SIZE	OUTSIDE DIA.	PIPE WEIGHT		NOM. SIZE	OUTSIDE DIA.	PIPE WEIGHT		OUTSIDE DIMENSIONS C-SECTION	WT/FT
						ASTM A 120	TRIPLE COAT			ASTM A 120	TRIPLE COAT		
7'	3'	10'	9'-8"	2?"	2.875"	5.79	4.64	2"	2.375"	3.65	3.11	1.875 x 1.625	2.28
6'	3'	9'	8'-8"	2"	2.375"	3.65	3.11	1?"	1.900"	2.72	2.23	1.875 x 1.625	1.85
5'	3'	8'	7'-8"	2"	2.375"	3.65	3.11	1?"	1.900"	2.72	2.23	1.875 x 1.625	1.85
4'	2'	6'	5'-8"	2"	2.375"	3.65	3.11	1?"	1.900"	2.72	2.23	1.875 x 1.625	1.85
3'	2'	5'	4'-8"	2"	2.375"	3.65	3.11	1?"	1.900"	2.72	2.23	1.875 x 1.625	1.85

REVISIONS

NO	DATE	APPR.	REMARKS

UTAH DEPARTMENT OF TRANSPORTATION
STANDARD DRAWINGS FOR ROAD AND BRIDGE CONSTRUCTION
SALT LAKE CITY, UTAH

RECOMMENDED FOR APPROVAL — MARCH 15,2004 DATE
CHAIRMAN STANDARDS COMMITTEE APPROVED — MARCH 15,2004 DATE
DEPUTY DIRECTOR

CHAIN LINK FENCE

STANDARD DRAWING TITLE

STD DWG
FG 6

APPENDIX 2

GEOTECHNICAL INVESTIGATION

Applied Geotechnical Engineering Consultants, Inc.

GEOTECHNICAL INVESTIGATION

PROPOSED LANDFILL

10500 WEST 900 SOUTH

PLAIN CITY, UTAH

PREPARED FOR:

MOULDING AND SONS
C/O HANSEN ALLEN & LUCE
6771 SOUTH 900 EAST
MIDVALE, UTAH 84047

ATTENTION: KENT STAHELI

PROJECT NO. 1080092

NOVEMBER 11, 2008

600 West Sandy Parkway • Sandy, Utah 84070 • (801) 566-6399 • FAX (801) 566-6493

TABLE OF CONTENTS

EXECUTIVE SUMMARY

1. The subsurface materials encountered at the site consist of approximately ½ to 1 foot of topsoil overlying predominantly clay in the lower portions of the site and sand, gravel and bedrock in the upper elevations of the site. The borings drilled along the north and west edges of the property encountered bedrock at relatively shallow depths and the borings refused in the bedrock at depths ranging from approximately 3 to 15½ feet. The soil thickness is substantially greater in the lower elevations of the site. Bedrock was encountered at depths of approximately 76, 29 and 95½ feet in Borings B-5, B-6 and B-7, respectively. Bedrock was not encountered in Boring B-5 but very dense gravel was encountered in the lower portion of the boring below a depth of approximately 91 feet.

2. Subsurface water was measured at depths ranging from approximately 6 to 12 feet. No subsurface water was encountered in Borings B-1, B-2 and B-3 as these borings terminated at a relatively shallow depth in bedrock.

3. We understand that the landfill could be on the order of 250 feet thick with side slopes on the order of 3 horizontal to 1 vertical and a total unit weight of the landfill of 45 to 75 pounds per cubic foot. Based on this assumption and the subsurface conditions encountered, we estimate settlement could be on the order of 5 to 6½ feet near the middle of the landfilled area for the waste density of 45 to 75 pounds per cubic foot, respectively.

4. Based on the subsurface conditions encountered, laboratory test results and our analysis, we estimate the safety factor against failure for the proposed landfill configuration to be 1.8 under static conditions and on the order of 1.2 under seismic conditions. The seismic condition does not consider the potential for liquefaction of the underlying soil.

5. The site is underlain predominantly by clay. There are some silt and sand layers. Some of the sand is potentially liquefiable. Information from the borings suggests that there could be up to approximately 6 inches of settlement due to IBC 2006 design ground motion. This liquefaction could result in some lateral movement of the south and east sides of the landfill. We estimate this lateral movement to be on the order of 2 feet for IBC 2006 design ground motion.

SCOPE

This report presents the results of a geotechnical investigation for a proposed landfill to be constructed at 10500 West 900 South in Plain City, Utah. The report presents the subsurface conditions encountered, laboratory test results and an estimate of settlement and stability for the landfill. The study was conducted in general accordance with our proposal dated February 20, 2008.

Field exploration was conducted to obtain information on the subsurface conditions. Samples obtained from the field investigation were tested in the laboratory to determine physical and engineering characteristics of the on-site soil. Information obtained from the field and laboratory was used to define conditions at the site for our engineering analysis.

This report has been prepared to summarize the data obtained during the study and to present our conclusions and recommendations based on the proposed construction and subsurface conditions encountered. Design parameters and a discussion of geotechnical engineering considerations related to construction are included in the report.

SITE CONDITIONS

At the time of our field investigation, there were no permanent structures or pavement on the site. Most of the site consists of undeveloped pasture. There is a strip of land along the west half of the north end of the property and the north half of the west edge of the property which we understand has been mined for aggregate.

The ground surface of the site generally slopes down toward the south and east, particularly along the north and west edges of the property. There is a depressed area in the northwest corner of the property where material has been removed. There is a small pond in this excavated area near the center of the west edge of the property which had water in it at the time of our field investigation.

Vegetation at the site consists predominantly of grass with some brush in the northwest portion of the property.

FIELD STUDY

The field study consisted of drilling eight borings, excavating seven test pits and pushing a cone for cone penetration testing at four locations. The borings were drilled between April 8 and 10, 2008 using 8-inch diameter, hollow-stem auger powered by an all-terrain drill rig. The test pits were excavated on April 24, 2008 using a rubber-tired backhoe. The borings and test pits were logged and soil samples obtained by an engineer from AGEC. Logs of the subsurface conditions encountered in the borings and test pits are graphically shown on Figures 2 through 6 with legend and notes on Figure 7.

The test pits were backfilled without significant compaction. The backfill in the test pits should be properly compacted where it will support proposed buildings, slabs or pavement.

The cone penetration tests were performed on April 30, 2008. Results of the tests are presented in the Appendix.

SUBSURFACE CONDITIONS

The subsurface materials encountered at the site consist of approximately ½ to 1 foot of topsoil overlying predominantly clay in the lower portions of the site and sand, gravel and bedrock in the upper elevations of the site. The borings drilled along the north and west edges of the property encountered bedrock at relatively shallow depths and the borings refused in the bedrock at depths ranging from approximately 3 to 15½ feet. The soil thickness is substantially greater in the lower elevations of the site. Bedrock was encountered at depths of approximately 76, 29 and 95½ feet in Borings B-5, B-6 and B-7, respectively. Bedrock was not encountered in Boring B-5 but very dense gravel was encountered in the lower portion of the boring below a depth of approximately 91 feet.

A description of the various soils and bedrock encountered in the borings and test pits follows:

Topsoil - The topsoil consists of lean clay with some sand and gravel particularly along the upper elevations at the site. The topsoil is moist, dark brown and contains roots and organics.

Lean Clay - The clay contains a small to moderate amount of sand and gravel with some silt and sand layers. The clay is very soft to very stiff, moist to wet and brown to green to gray with some iron oxide staining.

Laboratory tests performed on samples of the clay indicate that it has natural moisture contents ranging from 14 to 64 percent and natural dry densities ranging from 63 to 117 pounds per cubic foot (pcf). Results of consolidation tests performed on samples of the clay indicate that it will compress a small to large amount with the addition of light to heavy loads. Results of the consolidation tests are presented on Figures 8 through 14. Triaxial compression and direct shear tests were performed on samples of the clay. Results of these tests are presented on Figures 16, 17 and 19.

A permeability test was performed on a sample of the clay obtained from Test Pit TP-1 at a depth of approximately ½ foot. Results of the permeability test indicate that it has a permeability of $2x10^{-6}$ centimeters per second.

Interlayered Lean Clay and Silt - The interlayered soil contains some sand layers. It is soft to stiff, moist to wet and brown to gray with some cemented particles.

Laboratory tests performed on a sample of the interlayered soil indicate that it has a natural moisture content of 23 percent and a natural dry density of 98 pcf.

A permeability test was performed on a sample of the interlayered clay and silt obtained from Test Pit TP-7 at a depth of approximately 2½ feet. Results of the permeability test indicate that it has a permeability of 2×10^{-7} centimeters per second.

Clayey Sand - The sand contains some clay layers. It is loose to medium dense, moist to wet and brown to gray with some cemented layers and particles.

Laboratory tests performed on samples of the clayey sand indicate that it has natural moisture contents ranging from 15 to 20 percent and natural dry densities ranging from 112 to 120 pcf.

Silty Sand - The sand contains some clay layers. It is loose to medium dense, wet and brown to dark gray to green with some iron oxide staining.

Laboratory tests performed on samples of the silty sand indicate that it has natural moisture contents ranging from 18 to 34 percent and natural dry densities ranging from 90 to 111 pcf.

Poorly-Graded Sand with Silt - The sand contains some gravel and clay layers. It is medium dense to dense, wet and brown to gray with cemented particles.

Laboratory tests performed on samples of the sand indicate that it has natural moisture contents ranging from 10 to 11 percent and natural dry densities ranging from 123 to 129 pcf.

Interlayered Sand and Gravel - The sand and gravel contains some clay layers. It contains a small amount of silt, is medium dense to dense, wet and black to brown.

Clayey Gravel with Sand - The gravel is medium dense to dense, moist to wet and brown to gray.

Poorly-Graded Gravel with Sand - The gravel is medium dense, wet and brown to gray.

Bedrock - Two bedrock types were encountered at the site. One consists of a diamictite which is moderately to highly weathered, hard to very hard, variably cemented, fine-grained, clayey matrix with pebble to gravel-sized, subangular to angular inclusions. The rock is gray to dark gray and occasionally yellowish brown.

The other bedrock encountered consists of slate which is moderately to highly weathered, hard to very hard, highly foliated, has slaty cleavage and some iron staining along cleavage planes. The slate is gray to black.

Laboratory tests performed on a sample of the slate indicate that it has a natural moisture content of 3 percent and a natural dry density of 112 pcf. Results of a direct shear test performed on the slate which was ground to a powder, compacted into a mold near its natural moisture content and density are presented on Figure 15.

Results of the laboratory tests are summarized on Table I and are included on the logs of the borings and test pits.

SUBSURFACE WATER

Subsurface water was encountered at depths ranging from approximately 6 to 12 feet based on measurements taken up to approximately 167 days after drilling borings or excavation of test pits. No subsurface water was encountered in Borings B-1, B-2 and B-3 as these borings were drilled in the upper elevations of the site and encountered bedrock at a shallow depth. Slotted PVC pipe was installed in the borings and test pits to facilitate future measurement of the water level. Fluctuations in the water level can be expected over time.

PROPOSED CONSTRUCTION

We understand that the landfill will consist of construction waste with a significant amount of wood product. We understand that much of the concrete in the waste will be recycled for other uses and thus, the concrete content of the landfill will be relatively low. The landfill is planned to be approximately 250 feet in height with constructed side slopes of 3 horizontal to 1 vertical. Benches are planned for each approximately 50 feet of vertical rise.

STABILITY ANALYSIS

The stability analysis assumes that the waste will be composed of construction waste with a significant amount of wood product. Based on the literature, we have assumed a total unit weight for the landfill of 45 to 75 pcf and strengths consisting of a cohesion of 300 pounds per square foot (psf) and a friction angle of 33 degrees. Based on laboratory testing of the subsurface materials, we have assumed a total unit weight of 120 pcf, a cohesion of 420 psf and a friction angle of 18.5 degrees for the native soil below the landfill. Based on these assumptions, we have analyzed the stability of the landfill using the modified Bishop Method of analysis. A safety factor against failure under static conditions is estimated to be 1.8.

For the seismic condition in which a large magnitude earthquake may occur along the Wasatch Fault to the east of the site, we have assumed ground shaking with a probability of occurrence of 2 percent in 50 years factored by two-thirds. We have then assumed an allowable 2 inches of deformation. This results in a horizontal ground acceleration of 0.13g which was used to perform a pseudo-static analysis. Results of the analysis indicate that the safety factor is 1.2 for this seismic condition and the assumed landfill configuration and soil strengths as indicated above.

SETTLEMENT ANALYSIS

The estimate for settlement assumes the landfill layout as described in the Proposed Construction section of the report, a landfill total unit weight of 45 to 75 pcf and soil parameters determined from the subsurface conditions encountered and laboratory test results. Based on the results of our analysis, we estimate on the order of 5 to 6½ feet of settlement for the 45 to 75 pcf waste density, respectively, could occur towards the center of the landfilled area decreasing out toward the edges. No significant settlement is expected where the landfill will extend over the bedrock and the bedrock is at a relatively shallow depth such as along the north and west edges of the property.

LIQUEFACTION ANALYSIS

The site is underlain predominantly by clay which is not susceptible to liquefaction. However, there are some layers of sand which , based on the boring information, could liquefy during an IBC 2006 design seismic event. We estimate up to approximately 6 inches of liquefaction-induced settlement could occur as suggested by Boring B-5. This liquefaction could result in some lateral movement of the south and east sides of the landfill depending on the extent of the liquefaction. We estimate this lateral movement to be on the order of 2 feet for IBC 2006 design ground motion.

LIMITATIONS

This report has been prepared in accordance with generally accepted soil and foundation engineering practices in the area for the use of the client for design purposes. The conclusions and recommendations included within the report are based on the information obtained from the borings drilled, CPT testing, test pits excavated at the approximate locations indicated on Figure 1 and the data obtained from laboratory testing. Variations in the subsurface conditions may not become evident until additional exploration or excavation is conducted. If the proposed construction, subsurface conditions or groundwater level is found to be significantly different from what is described in this report, we should be notified to reevaluate the recommendations given.

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

11/24/08

Douglas R. Hawkes, P.E., P.G.

Reviewed by Matthew B. Olsen, P.E.

DRH/dc

Note: The engineering consultant for Weber County has submitted clarifications to information in the permit application regarding a test pit log and cone penetration tests, both related to ground water depth. These submittals are found on the following pages.

HAND DELIVERED

HANSEN ALLEN & LUCE INC
ENGINEERS

AUG 1 0 2009

UTAH DIVISION OF
SOLID & HAZARDOUS WASTE
2009.02598

SALT LAKE AREA OFFICE
6771 SOUTH 900 EAST
MIDVALE, UTAH 84047
PHONE: (801) 566-5599
FAX: (801) 566-5581
www.hansenallenluce.com

Utah Department of Environmental Quality
Division of Solid and Hazardous Waste
288 North 1460 West
P.O. Box 144880
Salt Lake City, Utah 84114-4880

August 10, 2009

RE: Weber County C&D Landfill Permit Application
Comments regarding Geotechnical Investigation Boring Logs

Gentlemen:

A review of the geotechnical logs associated with the geotechnical investigation was completed following the public comment meeting held on July 30, 2009. Upon reviewing the log associated with test pit TP-1, we observed that the ground water level indicated on the test pit log was at ground surface. Page III-2 of the design engineering report located in Exhibit A of the permit application states that the PVC pipe installed in TP-1 had been broken off by cattle on the property and was plugged with dirt below ground surface. Therefore, a depth measurement to gournd water reading could not be obtained at this location. After discussing the test pit log with Applied Geotechnical Engineering Consultants (AGEC) a spreadsheet file was located transferring elevation data to AGEC. The spreadsheet file included a PVC pipe elevation, depth to ground water measurement, and a ground water elevation calculated in the spreadsheet as the difference between the PVC pipe elevation and the depth to ground water measurement. The entry in the spreadsheet for depth to ground water for TP-1 was left blank because no measurement could be obtained. Therefore, the ground water elevation for TP-1 showed to be the same as ground surface in the spreadsheet calculation. The incorrect ground water elevation information for TP-1 was then transferred to the log showing ground water at ground surface. AGEC then researched the field record from the time the test pit was excavated and discovered that ground water was noted seeping into the test pit at a depth of 4.5 feet below ground surface. The test pit log has been corrected by AGEC with the attached letter dated August 4, 2009 and is submitted with this letter to include as a correction to the permit application.

We also observed the four cone penetration test logs included with the geotechnical investigation report project ground water surface to be within the first foot below ground surface. Cone penetration tests provide a record of resistance to movement of a cone tipped rod as it is pushed through the subsurface formations and to obtain pore pressure readings at specific depths. This provides an indication of formation materials and groundwater conditions and is only used to supplement actual borings and test pits where soil samples are retrieved and in which a piezometer (slotted PVC pipe) can be installed for accurate soil classification and more accurate ground water surface measurements.

Pore pressure readings in cone penetration tests are taken at specific depths by stopping the cone and allowing the pore pressures at the cone to stabilize. A pore pressure dissipation record (graph) is developed from readings as pore pressures stabilize at the specific depth of the cone. The ground water surface presented with the cone penetration logs is a projection based on the pore pressure readings at the specific depth. However, there is no evidence of ground water at the ground surface and the PVC pipe piezometers show ground water to be approximately 4 feet or more below ground surface. There are many subsurface formations between the location where pore pressure readings are collected and ground surface that greatly affect the true location of the ground water surface. These include confining layers resulting in confined aquifer conditions, formations that intercept and transport ground water that may have an upward gradient, head losses resulting from upward movement of ground water through various formations, or other types of conditions.

Ground water surface contours provided in the drawings with the permit application are based on physical measurements to ground water from installation of PVC pipe in geotechnical borings and in test pits. Therefore, the ground water surface contours presented represent actual ground water conditions at the site.

We hope this letter provides clarification needed regarding the correction to the TP-1 log and to the ground water contours generated in the permit application. Please include this letter and the corrected sheet including the TP-1 log in the permit application and please feel free to call if you need any additional information or clarifications regarding the permit application.

Sincerely,

HANSEN, ALLEN & LUCE, INC.

Gordon L. Jones, P.E.
Engineer

attachments

Applied Geotechnical Engineering Consultants, Inc.

August 4, 2009

RECEIVED
AUG 06 2009
HA & L

Moulding and Sons
c/o Hansen Allen & Luce, Inc.
6771 South 900 East
Midvale, UT 84047

Attention: Kent Staheli
FAX: 566-5581

Subject: Subsurface Water
Proposed Landfill
10500 West 900 South
Plain City, Utah
AGEC Project No. 1080092

Gentlemen:

Applied Geotechnical Engineering Consultants, Inc. was requested to comment concerning the water levels reported for the proposed landfill to be constructed at 10500 West 900 South in Plain City, Utah. We previously performed a geotechnical investigation and submitted our findings and recommendations in a report dated November 11, 2008 under Project No. 1080092. We also provided a description of geologic conditions at the site in a letter dated December 4, 2008 under the same project number.

The water level reported for Test Pit TP-1, which was supposedly taken 151 days after excavation of the test pit, is not correct. The water as shown on Test Pit TP-1 was based on a table provided by Hansen Allen & Luce in which they measured the pipe elevation at the test pit and boring locations and also measured the depth to groundwater from the top of the pipe. We understand that the table was produced from a spread sheet which calculated the difference between the pipe elevation and depth to groundwater and reported the groundwater elevations in a separate column. Since the depth to groundwater was left blank on this table, the groundwater elevation was shown to be the same elevation as the pipe elevation. We understand that the pipe for this test pit had been destroyed by cattle activity in the area and so no depth to groundwater could be obtained.

Water was observed to be seeping into Test Pit TP-1 at the time of excavation at a depth of approximately 4½ feet below the ground surface. The water was seeping into the test pit through a sand layer at this depth. A revised Figure 6 has been attached that shows water seepage at the time of test pit excavation at 4½ feet.

It should be noted that the elevation for borings and test pits were based on the pipe elevations provided by HA&L. The elevations were rounded down to the nearest foot and reported on the boring and test pit logs. The amount that the pipe extended above the ground surface varied and thus, this elevation is typically, higher than the ground surface elevation at the borings and test pits.

If you have questions or if we can be of further service, please call.

Sincerely,

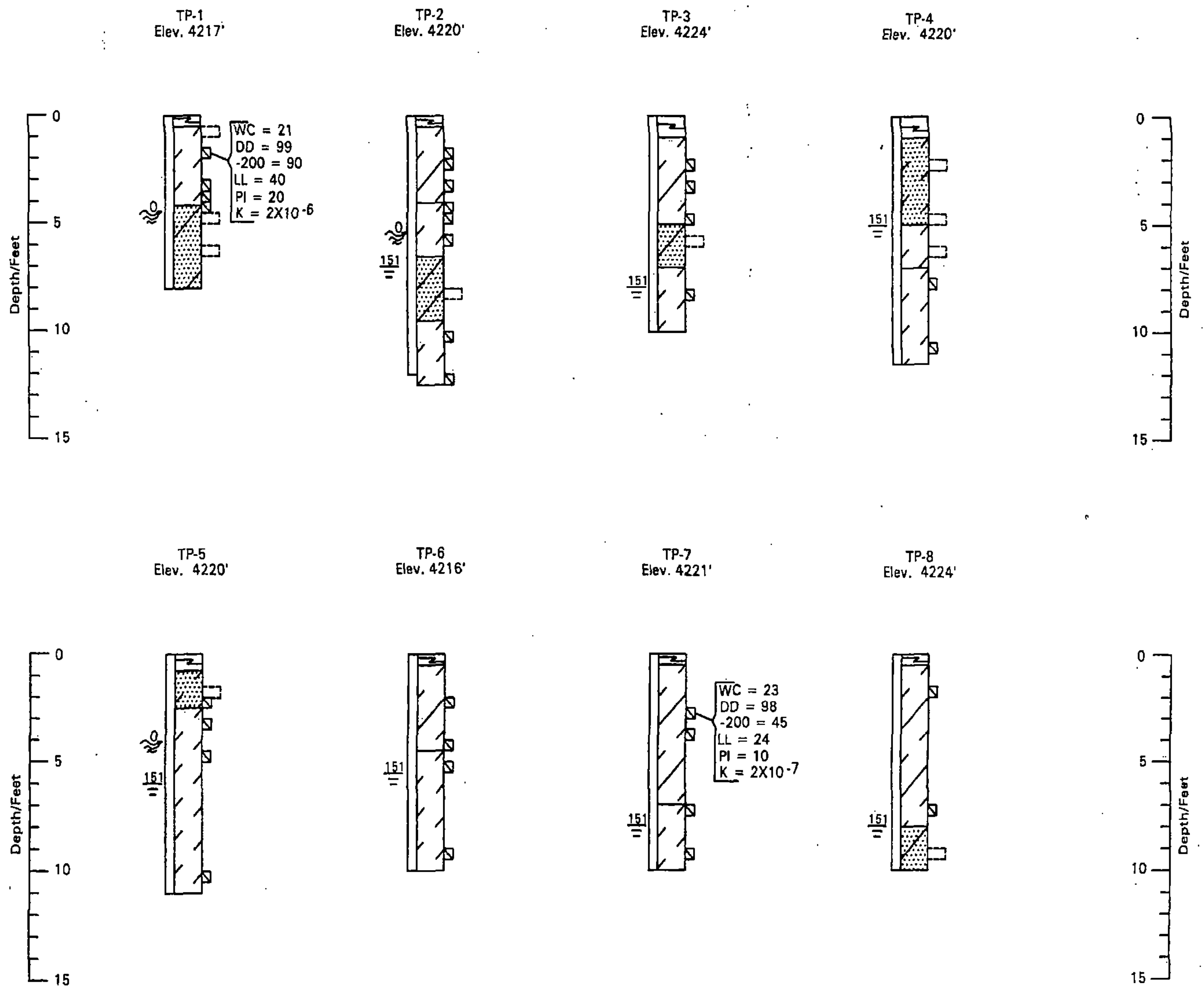
APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

8/5/09
No. 260053
DOUGLAS R.
HAWKES
STATE OF UTAH

Douglas R. Hawkes

Douglas R. Hawkes, P.E., P.G.

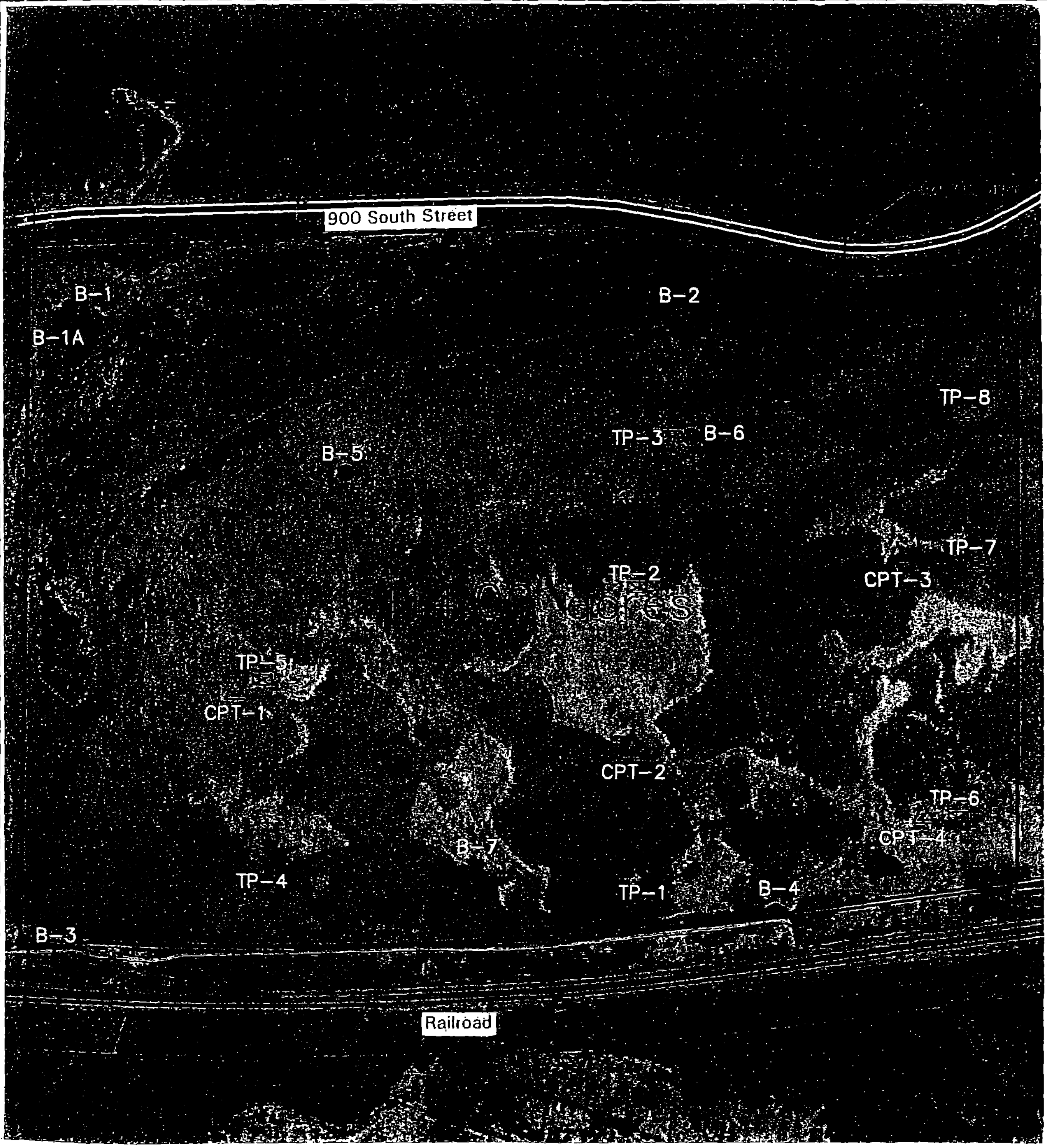
Reviewed by SDA, P.E.
DRH/dc
Enclosure



Approximate Vertical Scale 1" = 8'

See Figure 7 for Legend and Notes

1080092	AGEC	Logs of Test Pits	Figure 6



N

0 400 800 feet
Approximate Scale

PROPOSED LANDFILL
10500 WEST 900 SOUTH
PLAIN CITY, UTAH

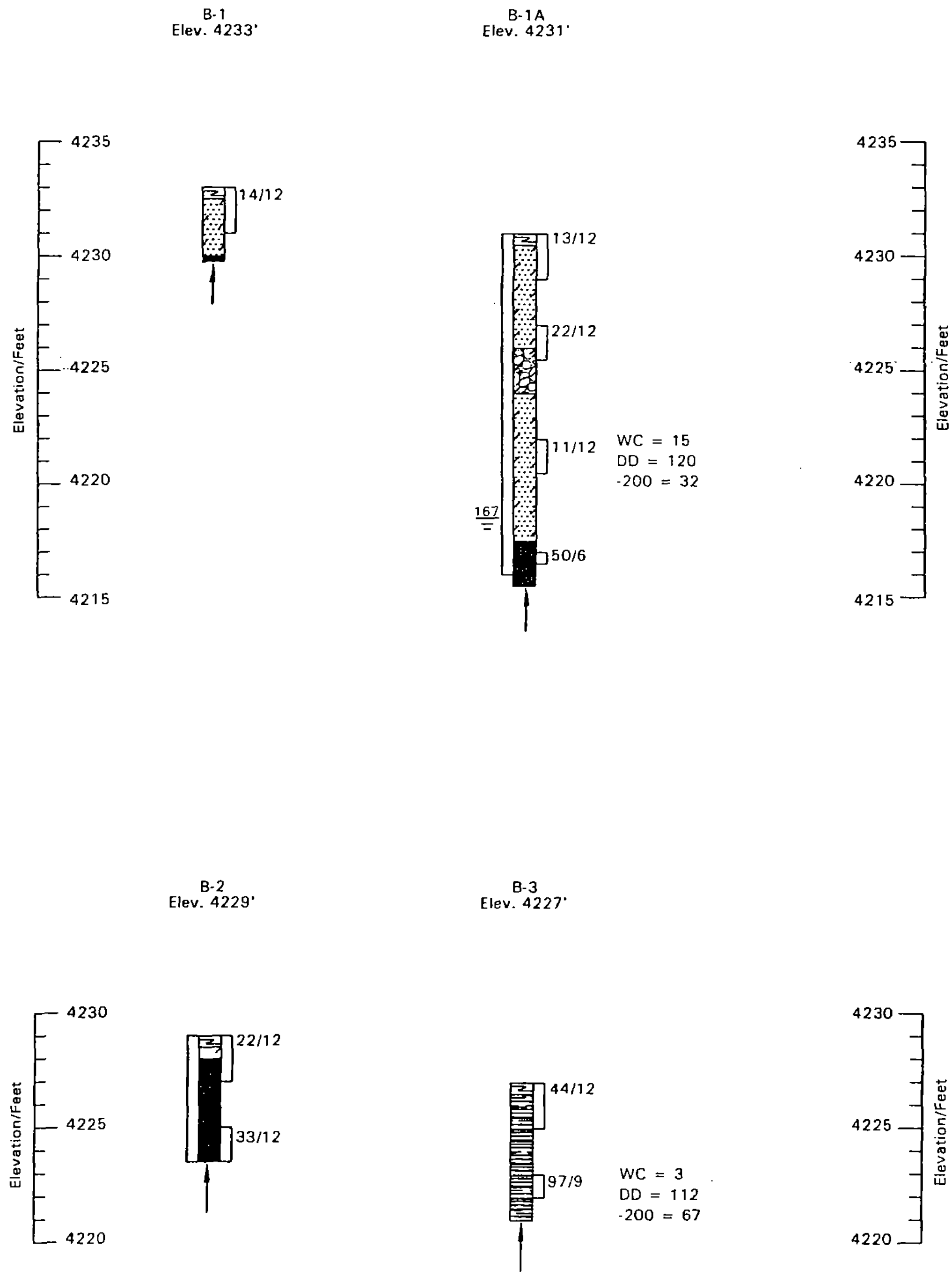
Legend:

● Indicates Boring Locations

⊠ Indicates Test Pit Locations

△ Indicates CPT Locations

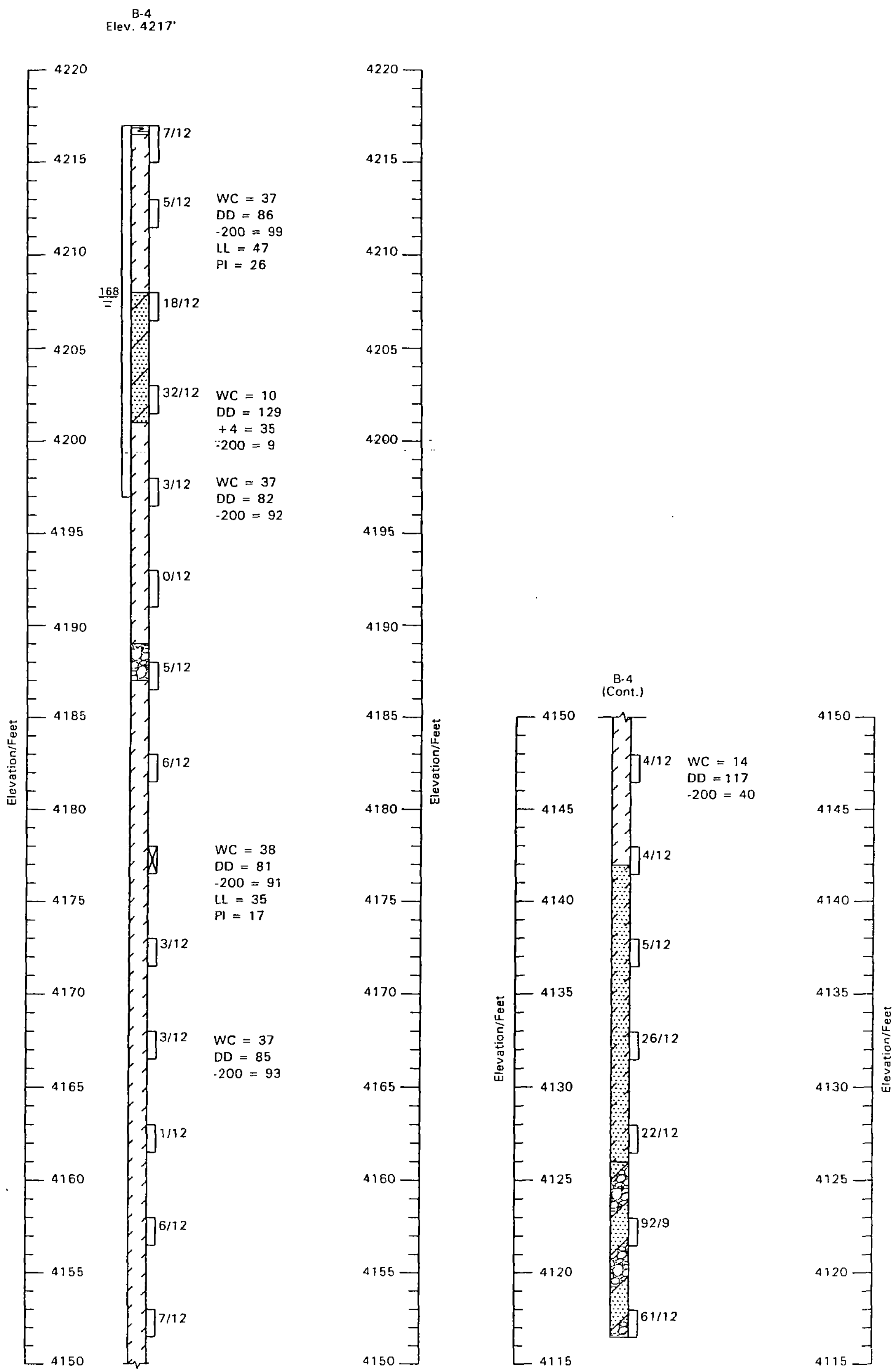
1080092	AGEC	Locations of Exploratory Borings and Test Pits	Figure 1



Approximate Vertical Scale 1" = 8'

See Figure 7 for Legend and Notes

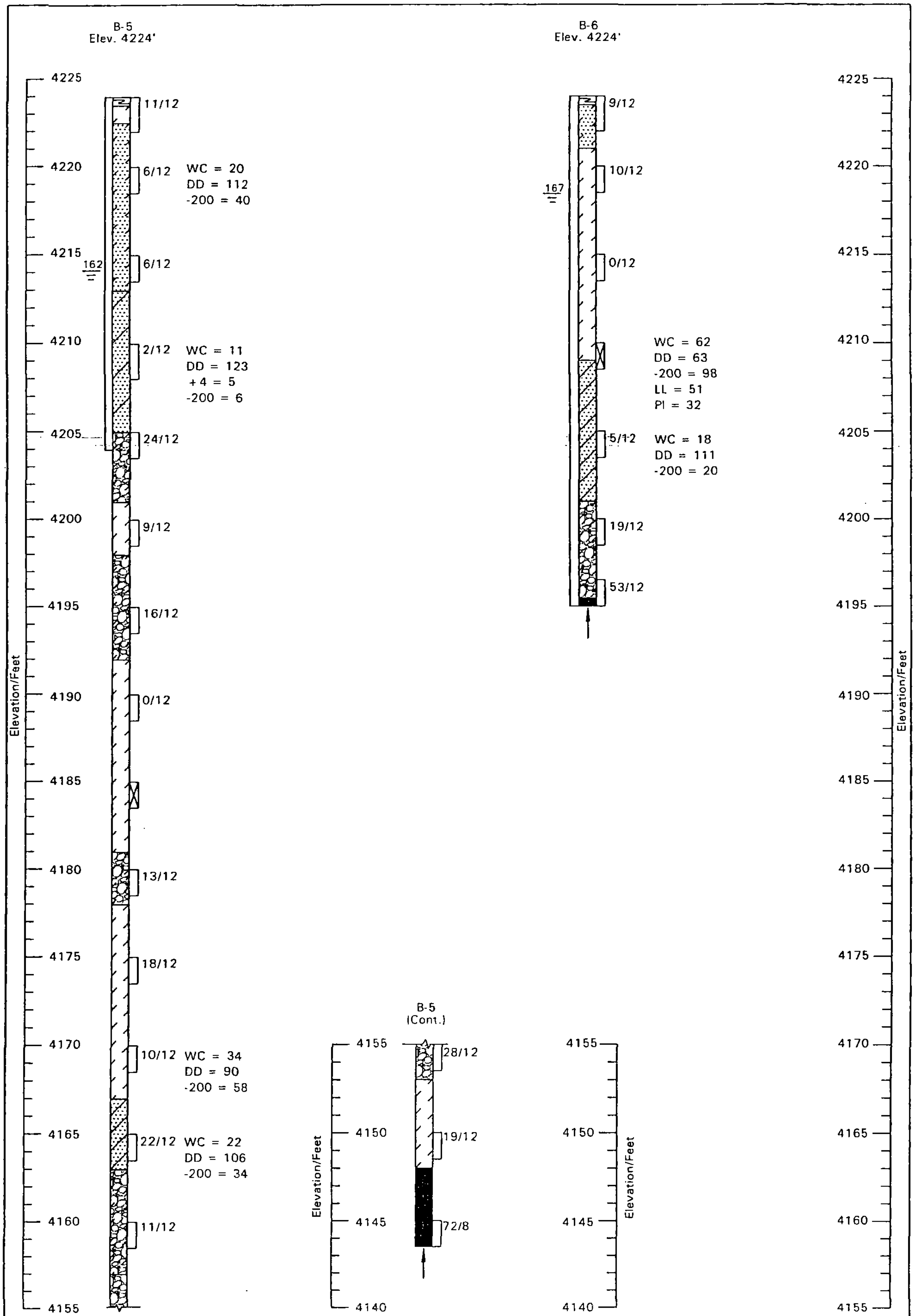
1080092	AGEC	Logs of Exploratory Borings	Figure 2



Approximate Vertical Scale 1" = 8'

See Figure 7 for Legend and Notes

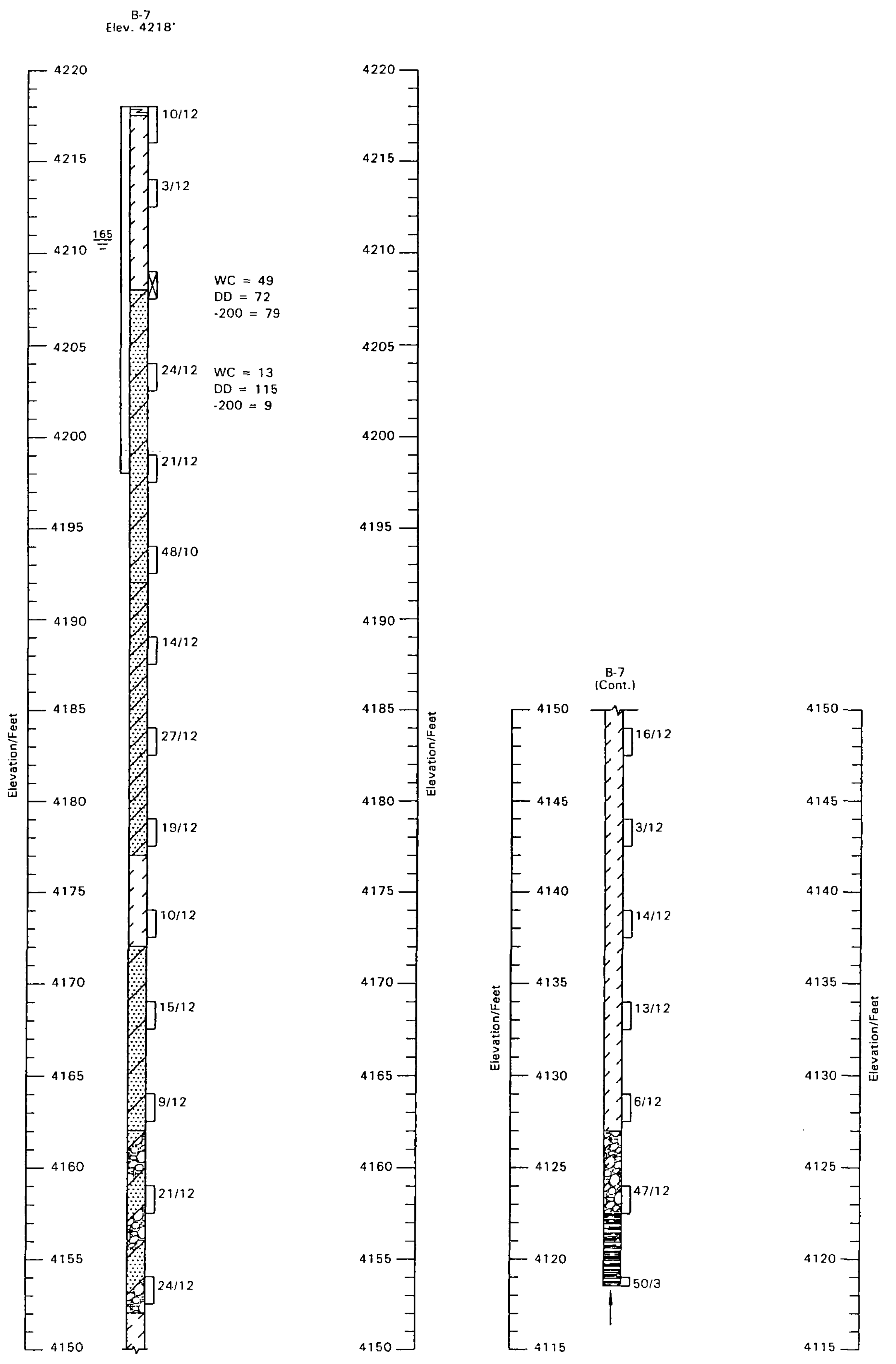
1080092	AGEC	Logs of Exploratory Borings	Figure 3



Approximate Vertical Scale 1" = 8'

See Figure 7 for Legend and Notes

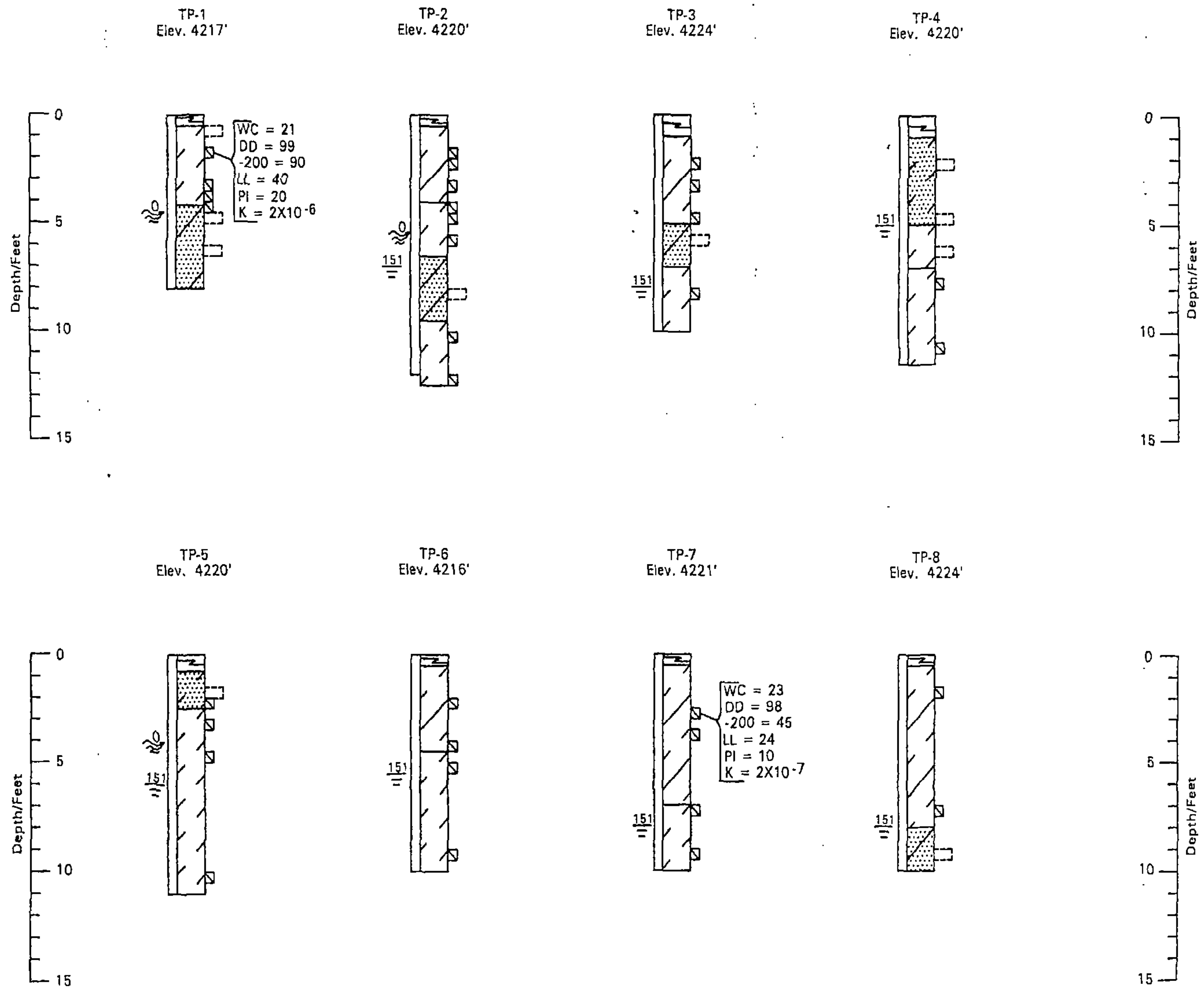
1080092	AGES	Logs of Exploratory Borings	Figure 4



Approximate Vertical Scale 1" = 8'

See Figure 7 for Legend and Notes

1080092	AGES	Logs of Exploratory Borings	Figure 5



Approximate Vertical Scale 1" = 8'

See Figure 7 for Legend and Notes

1080092	AGEC	Logs of Test Pits	Figure 6

LEGEND:

Topsoil: lean clay, some sand and gravel, moist, dark brown, roots, organics.

Lean Clay (CL); small to moderate amount of sand and gravel, some silt and sand layers, very soft to very stiff, moist to wet, brown to green to gray, some iron oxide staining.

Interlayered Lean Clay and Silt (CL/ML): some sand layers, soft to stiff, moist to wet, brown to gray, some cemented particles.

Clayey Sand (SC): some clay layers, loose to medium dense, moist to wet, brown to dark gray, some cemented layers and particles.

Silty Sand (SM); some clay layers, loose to medium dense, wet, brown to dark gray to green, some iron oxide staining.

Poorly-graded Sand with Silt (SP-SM); some gravel and clay layers, medium dense to dense, wet, brown to dark gray, some cemented particles.

Interlayered Sand and Gravel (SP/GP); some clay layers, small amount of silt, medium dense to very dense, wet, black to brown.

Clayey Gravel with Sand (GC); medium dense to dense, moist to wet, brown to gray.

Poorly-graded Gravel with Sand (GP); medium dense, wet, brown to dark gray.

Diamictite, hard to very hard, moderately to highly weathered, friable to moderately hard, variably cemented fine-grained clayey matrix with pebble to gravel-sized subangular to angular inclusions, gray to dark gray, occasionally yellowish brown.

Slate, , moderately to highly weathered, hard to very hard, highly foliated, slaty cleavage, gray to black, some iron staining along cleavage planes.

10/12 California Drive sample taken. The symbol 10/12 indicates that 10 blows from a 140 pound automatic hammer falling 30 inches were required to drive the sampler 12 inches.

Indicates Shelby Tube sample taken.

Indicates relatively undisturbed hand drive sample taken.

Indicates disturbed sample taken.

LEGEND (Cont.):

Indicates slotted 1 ½ inch PVC pipe installed in the boring to the depth shown.

16/7 Indicates the depth to free water and the number of days after drilling the measurement was taken.

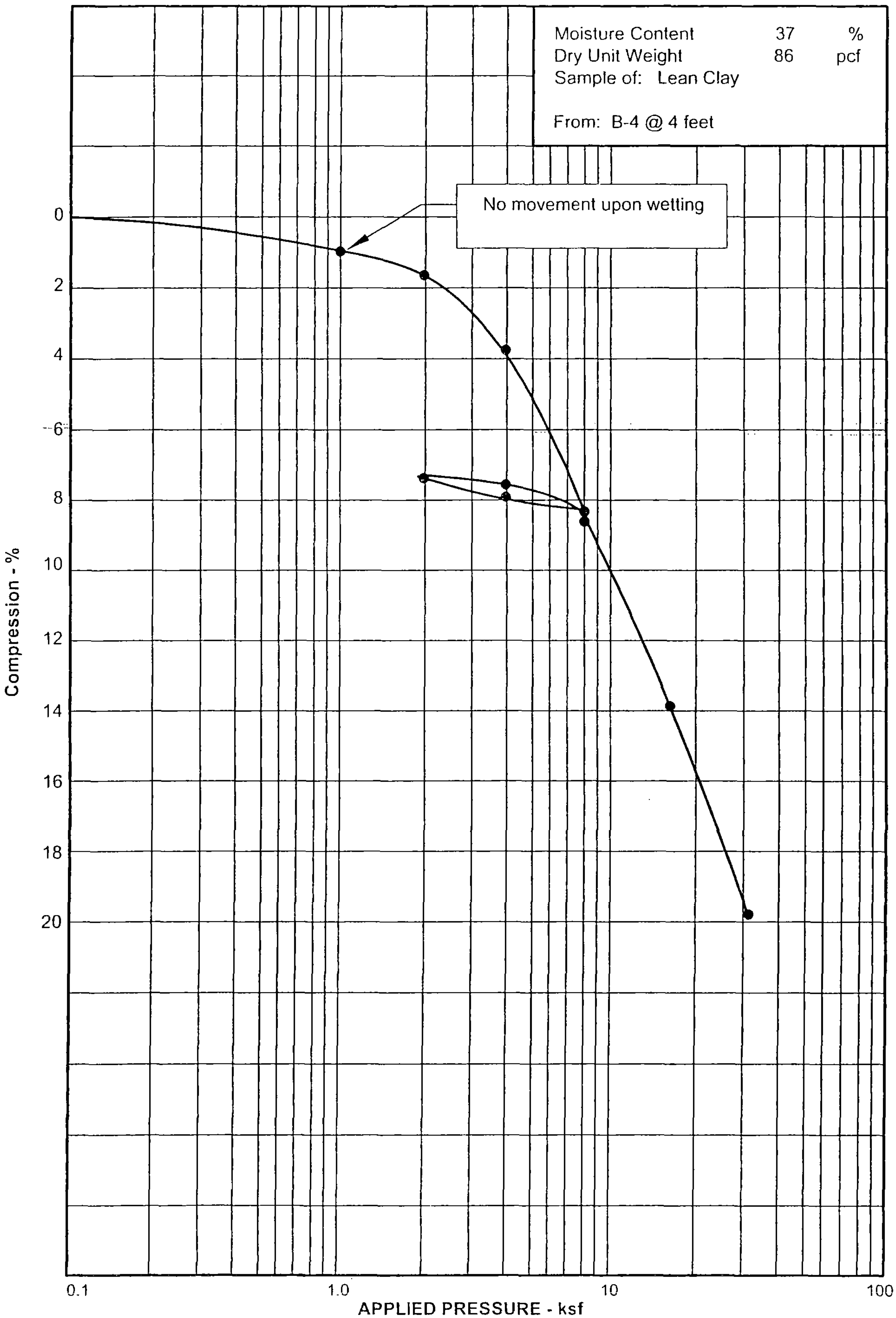
Indicates practical auger refusal.

NOTES:

1. Borings were drilled on April 8, 9 and 10, 2008 with 8-inch diameter hollowstem auger. Test Pits were excavated on April 24, 2008 with rubber-tired backhoe.
2. Locations of borings and test pits were surveyed by Hansen, Allen & Luce.
3. Elevations of borings and test pits were determined by Hansen, Allen & Luce.
4. The boring and test pit locations and elevations should be considered accurate only to the degree implied by the method used.
5. The lines between the materials shown on the boring and test pit logs represent the approximate boundaries between material types and the transitions may be gradual.
6. Water level readings shown on the logs were made at the time and under the conditions indicated. Fluctuations in the water level may occur with time.
7. WC = Water Content (%);
   DD = Dry Density (pcf);
   +4 = Percent Retained on No. 4 Sieve;
   -200 = Percent Passing No. 200 Sieve;
   LL = Liquid Limit (%);
   PI = Plasticity Index (%);
   K = Permeability (cm/sec).

1080092	AGEC	Legend and Notes of Exploratory Borings and Test Pits	Figure 7

Applied Geotechnical Engineering Consultants, Inc.

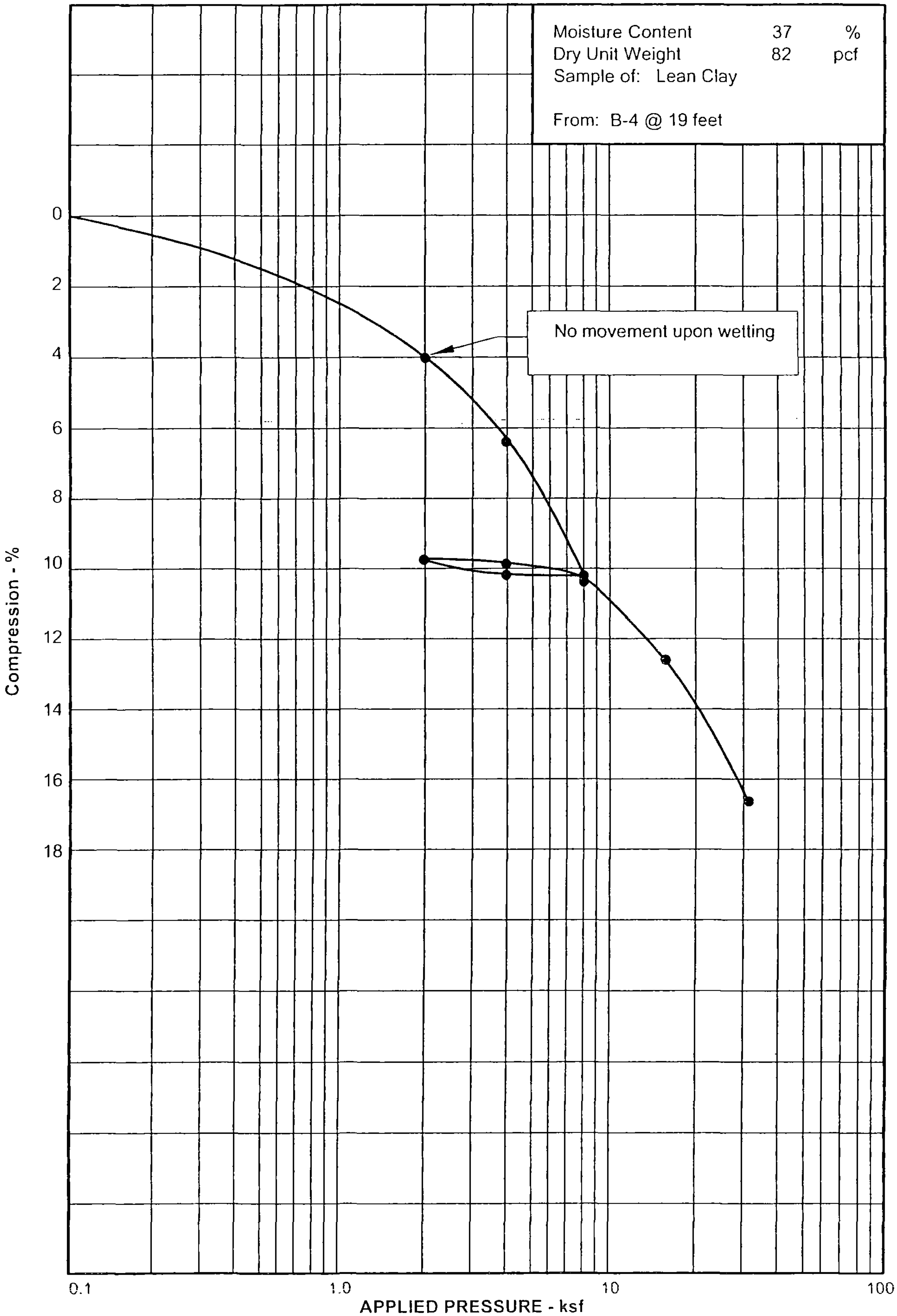


Project No. 1080092

CONSOLIDATION TEST RESULTS

Figure 8

Applied Geotechnical Engineering Consultants, Inc.

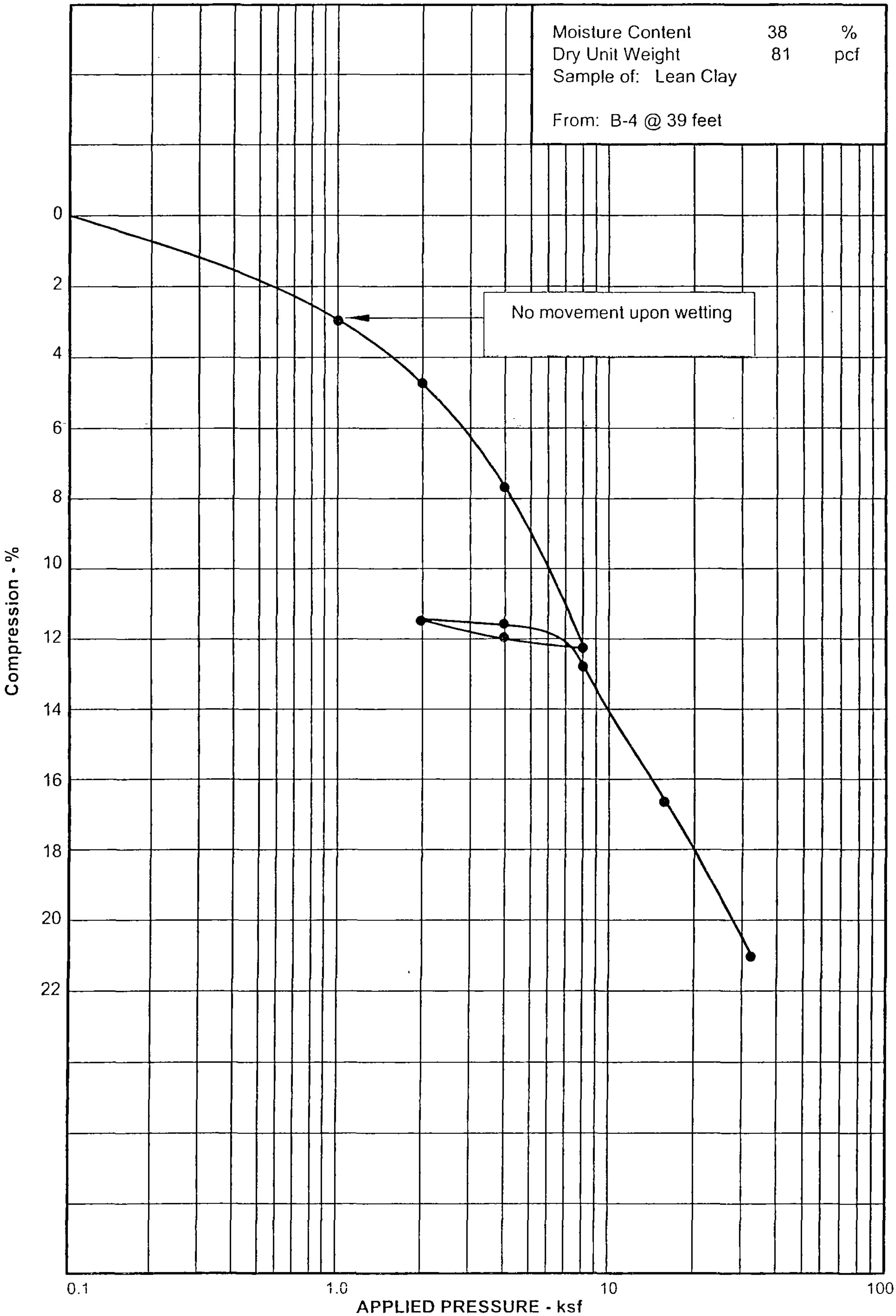


Project No. 1080092

CONSOLIDATION TEST RESULTS

Figure 9

Applied Geotechnical Engineering Consultants, Inc.

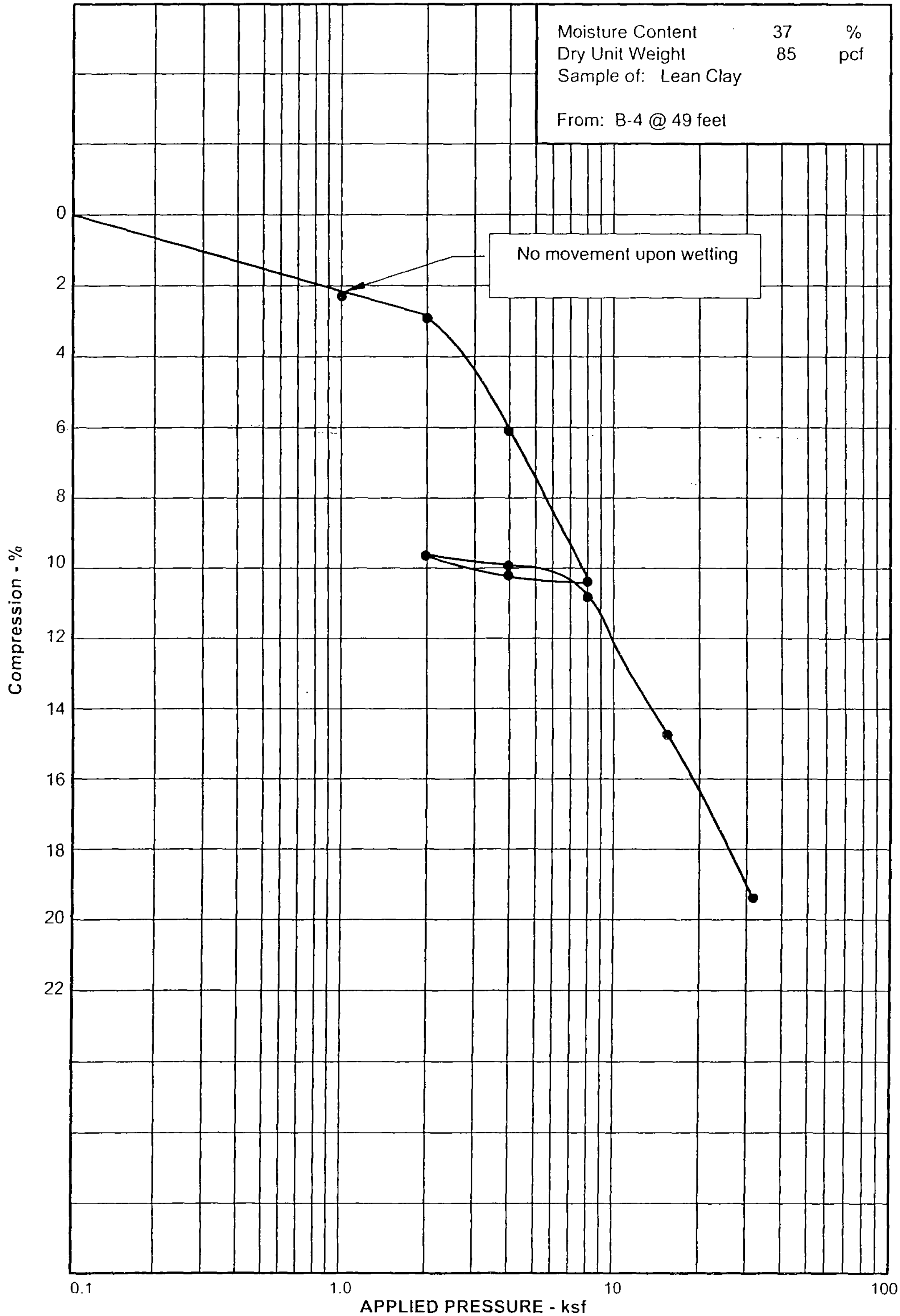


Project No. 1080092

CONSOLIDATION TEST RESULTS

Figure 10

Applied Geotechnical Engineering Consultants, Inc.

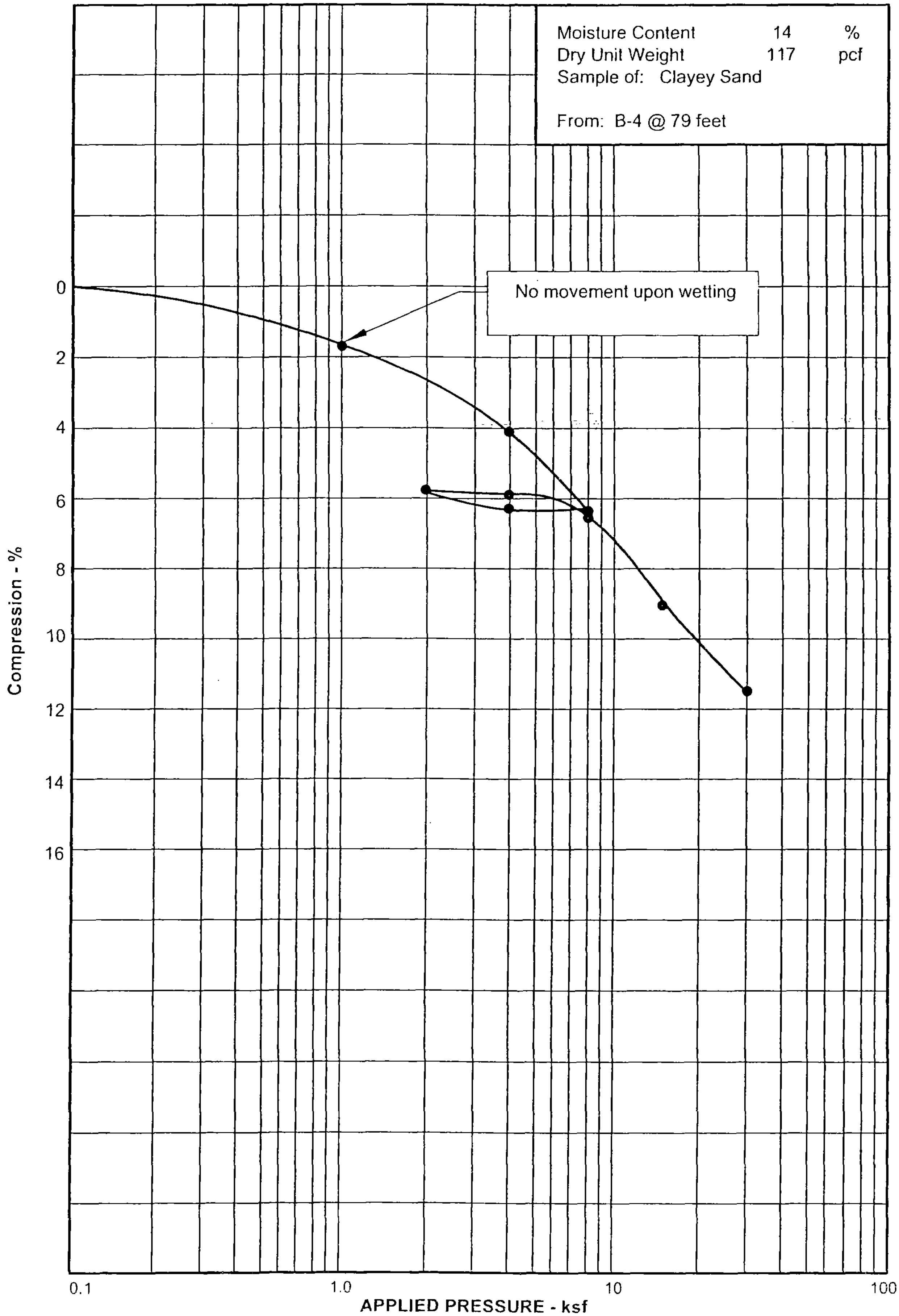


Project No. 1080092

CONSOLIDATION TEST RESULTS

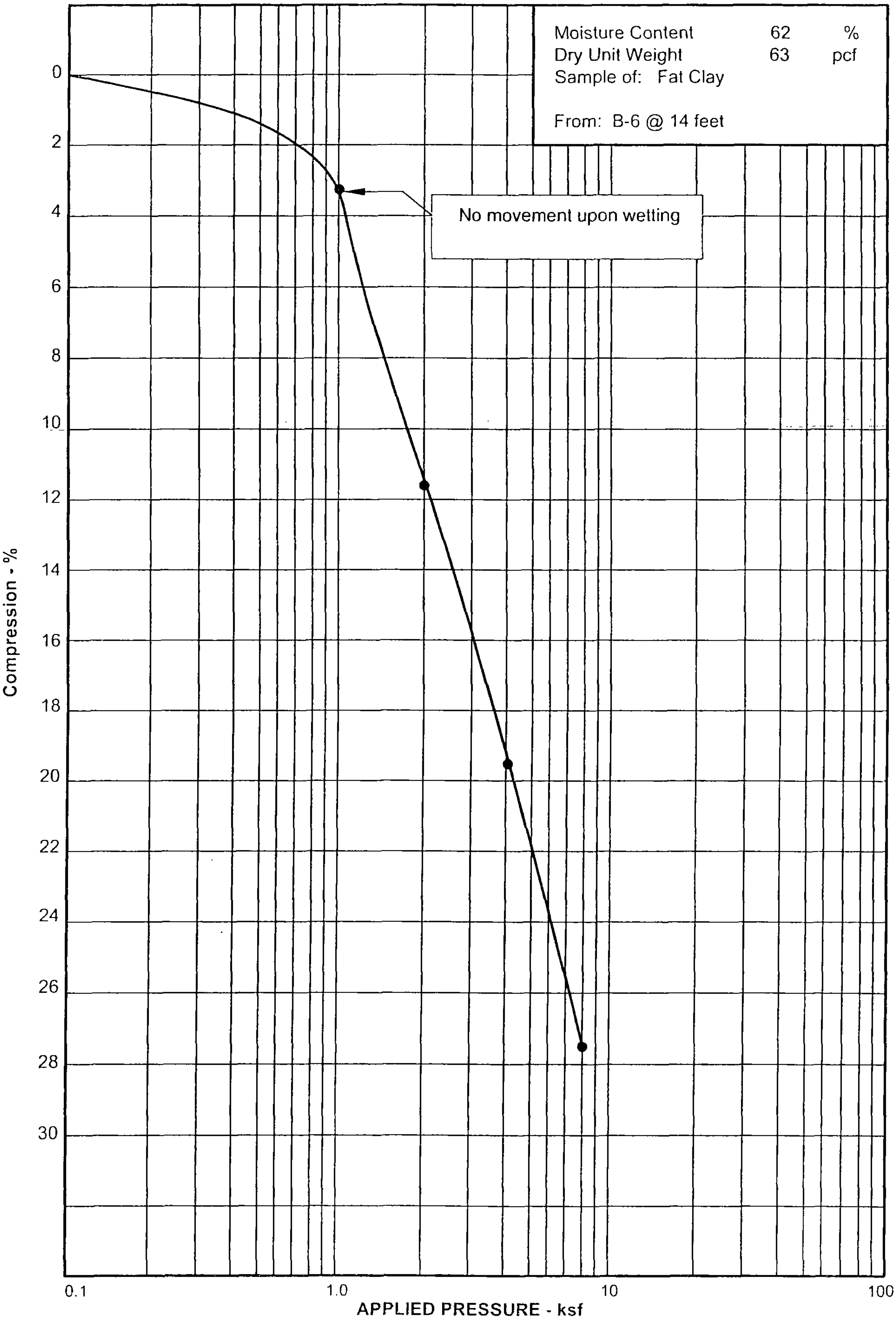
Figure 11

Applied Geotechnical Engineering Consultants, Inc.



Project No. 1080092 CONSOLIDATION TEST RESULTS Figure 12

Applied Geotechnical Engineering Consultants, Inc.

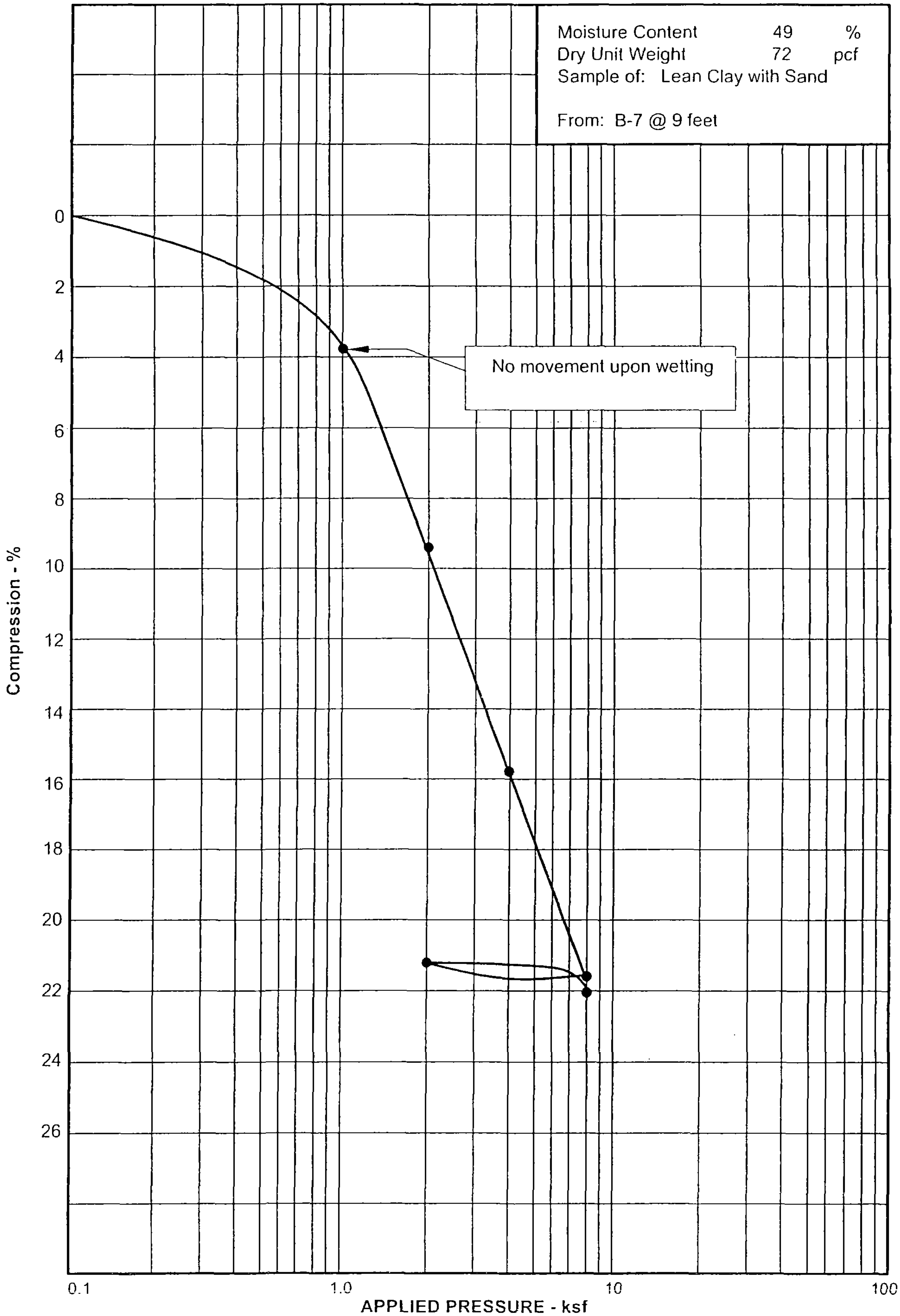


Project No. 1080092

CONSOLIDATION TEST RESULTS

Figure 13

Applied Geotechnical Engineering Consultants, Inc.

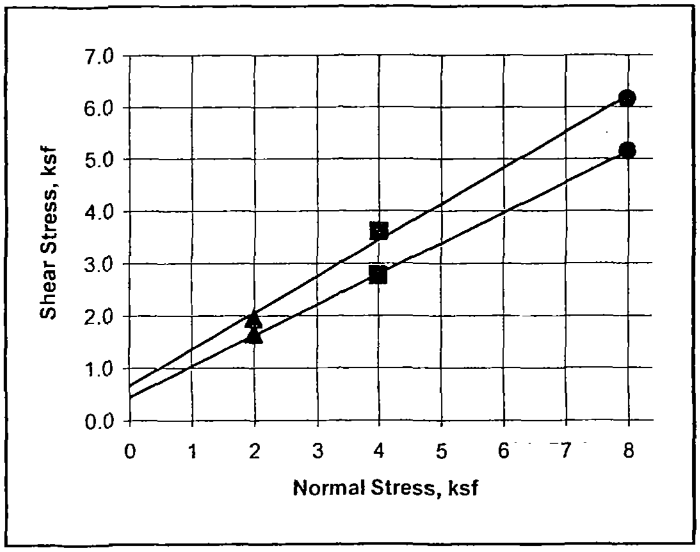


Project No. 1080092

CONSOLIDATION TEST RESULTS

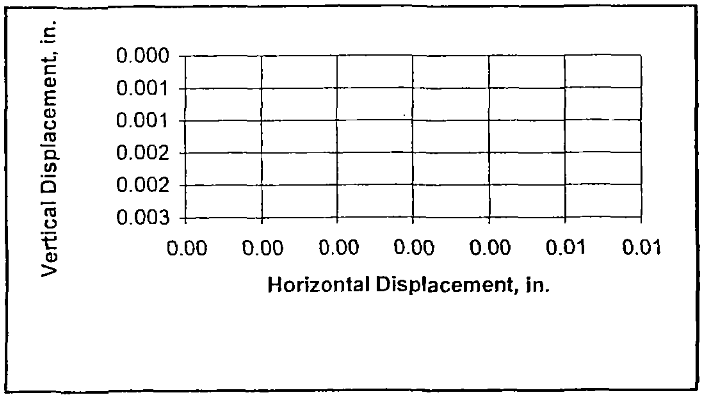
Figure 14

Applied Geotechnical Engineering Consultants, Inc.



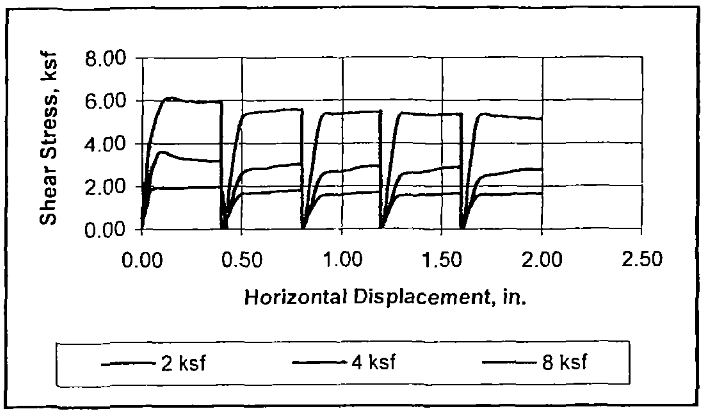
Peak	**c = 670 psf**	**ϕ = 35 deg**
Residual	**c = 450 psf**	**ϕ = 30 deg**

Project and Sample Information	
Project Number	1080092
Project Name	Moulding
Sample Identification	B-3@4 feet
Sample Description	Slate



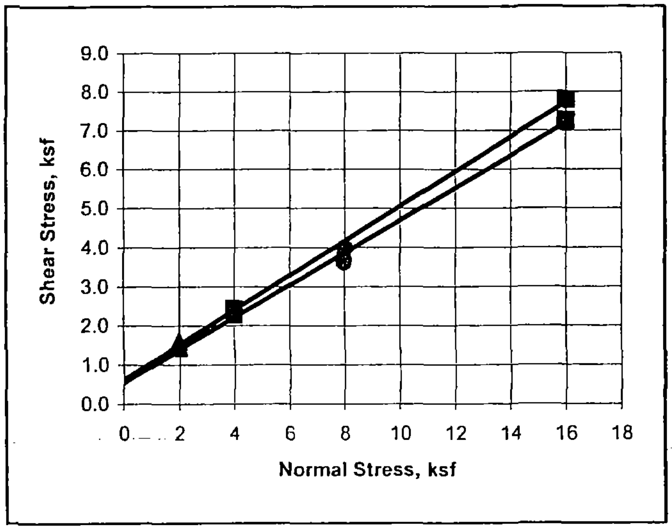
Test No. (Symbol)	1 (▲)	2 (■)	3 (●)
Test Type	Consolidated Wetted		
Sampe Type	Remolded		
Length, in.	1.00		
Diameter, in.	2.00		
Dry Density, pcf			
Moisture Content, %			
Consol. Load, ksf	2	4	8
Normal Load, ksf	2	4	8
Shear Stress, ksf Peak	1.9	3.6	6.2
Shear Stress, ksf Residual	1.6	2.8	5.2
Rate of Strain	0.002 in/min		

Comments: *Sample was ground to powder and remolded to 110 pcf at 3 percent moisture prior to testing. Sample was sheared thru five cycles.*



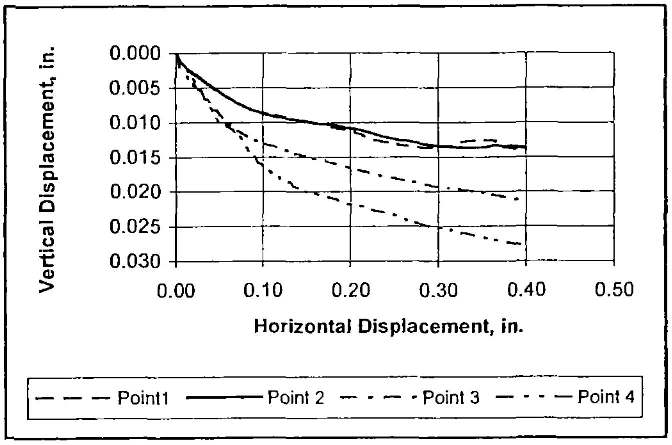
Sample Properties	
Dry Density, pcf	112
Moisture Content, %	3
Liquid Limit, %	-
Plasticity Index, %	-
Percent Gravel	-
Percent Sand	-
Percent passing No. 200 Sieve	67

Applied Geotechnical Engineering Consultants, Inc.

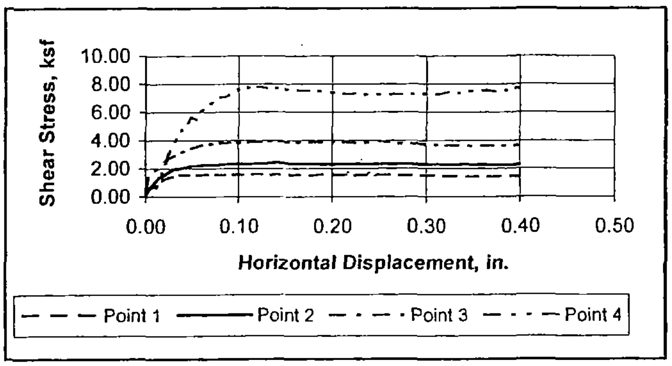


Peak	**c = 620 psf**	**ϕ = 24 deg**
Residual	**c = 550 psf**	**ϕ = 23 deg**

Project and Sample Information	
Project Number	1080092
Project Name	Moulding
Sample Identification	B-4@39 feet
Sample Description	Lean Clay



Test No. (Symbol)	1 (▲)	2 (■)	3 (●)	4 (■)
Test Type	Consolidated Wetted			
Sampe Type	Undisturbed			
Length, in.	1.00	1.00	1.00	1.00
Diameter, in.	1.93	1.93	1.93	1.93
Dry Density, pcf	81			
Moisture Content, %	38			
Consol. Load, ksf	2	4	8	16
Normal Load, ksf	2	4	8	16
Shear Stress, ksf Peak	1.6	2.4	4.0	7.8
Shear Stress, ksf Residual	1.4	2.3	3.6	7.3
Rate of Strain	0.0086 in/min			
Comments:				



Sample Properties	
Dry Density, pcf	81
Moisture Content, %	38
Liquid Limit, %	35
Plasticity Index, %	17
Percent Gravel	-
Percent Sand	-
Percent passing No. 200 Sieve	91

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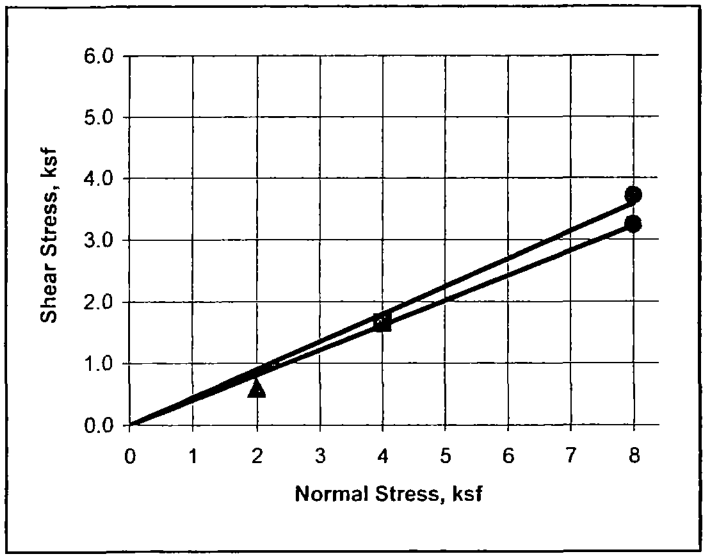
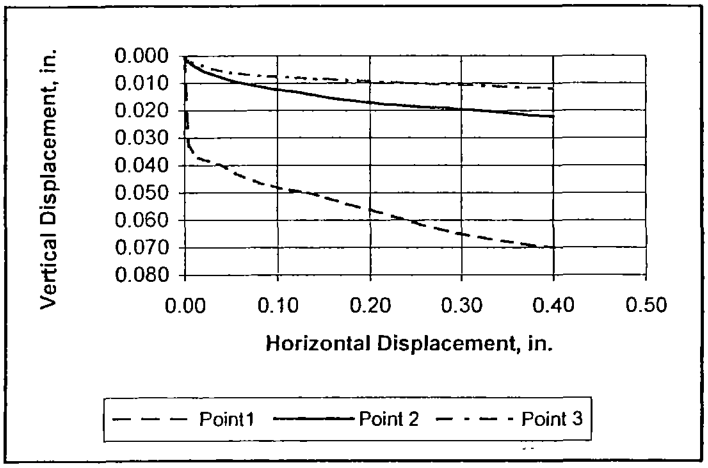
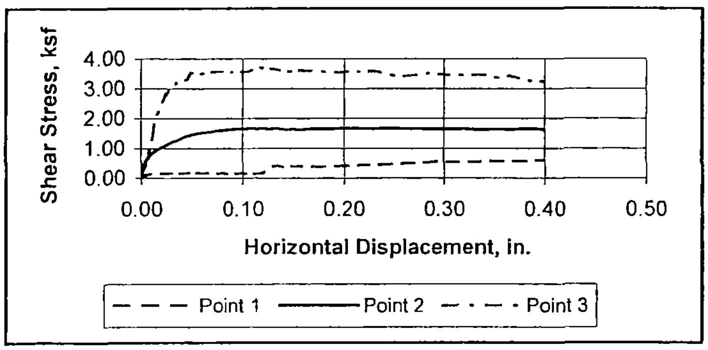


Peak	**c = 0 psf**	**ϕ = 24 deg**
Residual	**c = 0 psf**	**ϕ = 22 deg**

Project and Sample Information	
Project Number	1080092
Project Name	Moulding
Sample Identification	B-6@14 feet
Sample Description	Fat Clay

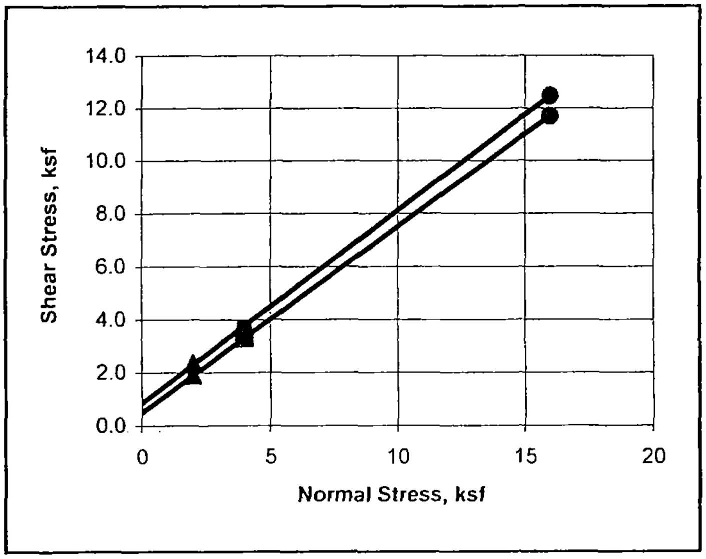


Test No. (Symbol)	1 (▲)	2 (■)	3 (●)
Test Type	Consolidated Wetted		
Sampe Type	Undisturbed		
Length, in.	1.00	1.00	1.00
Diameter, in.	1.93	1.93	1.93
Dry Density, pcf	63		
Moisture Content, %	62		
Consol. Load, ksf	2	4	8
Normal Load, ksf	2	4	8
Shear Stress, ksf Peak	0.6	1.7	3.7
Shear Stress, ksf Residual	0.6	1.7	3.3
Rate of Strain	0.0086 in/min		
Comments:			



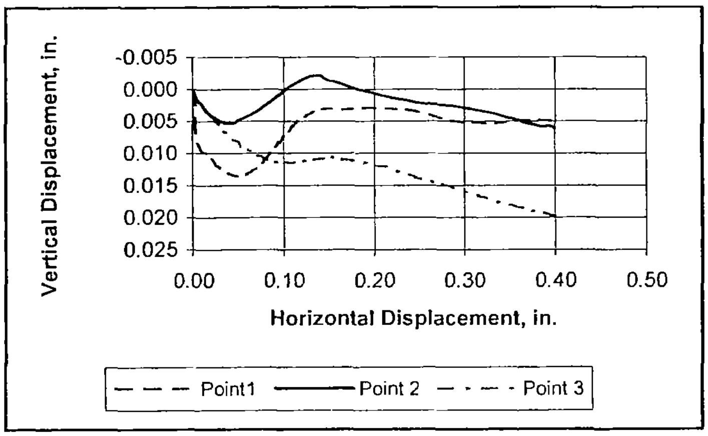
Sample Properties	
Dry Density, pcf	63
Moisture Content, %	62
Liquid Limit, %	51
Plasticity Index, %	32
Percent Gravel	-
Percent Sand	-
Percent passing No. 200 Sieve	99

Applied Geotechnical Engineering Consultants, Inc.

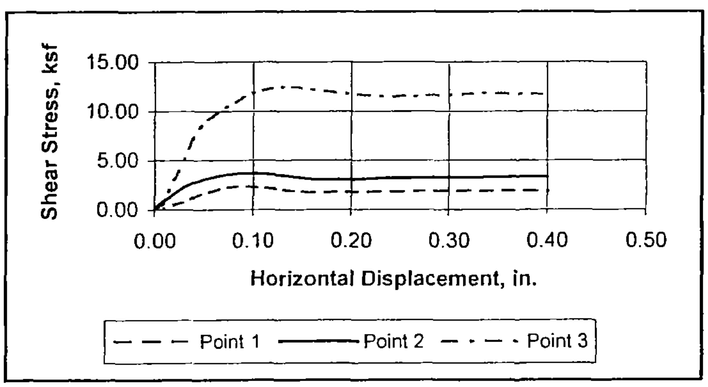


Peak	**c = 860 psf ϕ = 36 deg**
Residual	**c = 500 psf ϕ = 35 deg**

Project and Sample Information	
Project Number	1080092
Project Name	Moulding
Sample Identification	B7@14 feet
Sample Description	Poorly-graded Sand with Silt

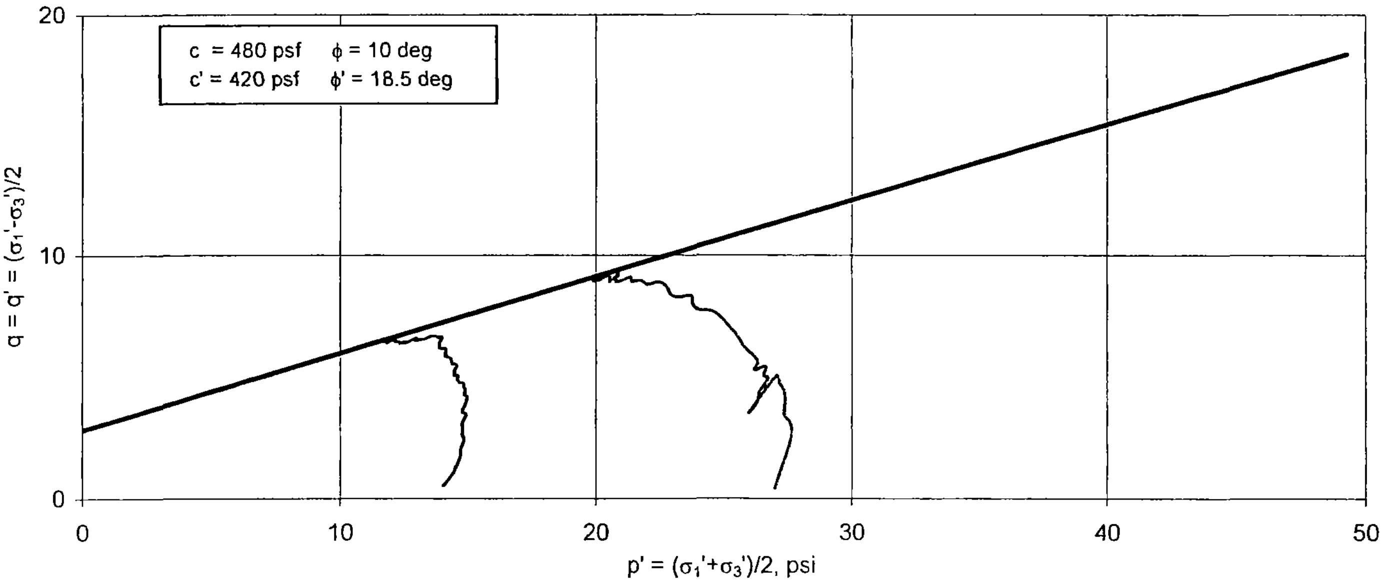


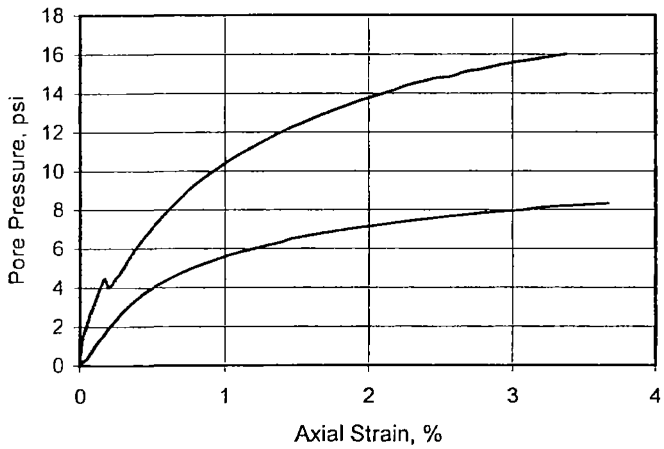
Test No. (Symbol)	1 (▲)	2 (■)	3 (●)
Test Type	Consolidated Wetted		
Sampe Type	Undisturbed		
Length, in.	1.00	1.00	1.00
Diameter, in.	1.93	1.93	1.93
Dry Density, pcf	115		
Moisture Content, %	13		
Consol. Load, ksf	2	4	16
Normal Load, ksf	2	4	16
Shear Stress, ksf Peak	2.4	3.7	12.5
Shear Stress, ksf Residual	1.9	3.3	11.7
Rate of Strain	0.0033 in/min		
Comments:			

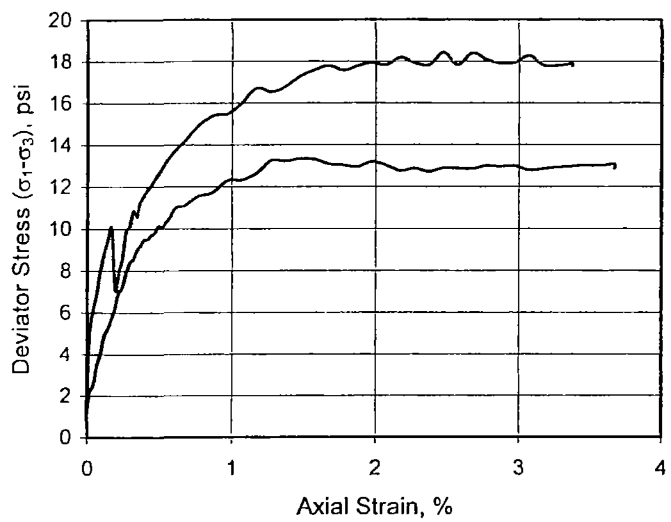


Sample Properties	
Dry Density, pcf	115
Moisture Content, %	13
Liquid Limit, %	-
Plasticity Index, %	-
Percent Gravel	-
Percent Sand	-
Percent passing No. 200 Sieve	9

Applied Geotechnical Engineering Consultants, Inc.







Test No. (Symbol)	O	□	
Sample Type	undisturbed		
Final Length, in.	3.99	3.80	
Final Diameter, in.	1.85	1.66	
Dry Density, pcf	64		
Moisture Content, %	64		
Consolidation Pressure, ksf	2	4	
"B" Parameter	0.96	0.96	
Total Confining Stress (σ_3), psi	13.4	26.4	
Total Axial Stress (σ_1), psi	26.3	44.2	
Deviator Stress $(\sigma_1-\sigma_3)$, psi	12.9	17.8	
Effective Lateral Stress (σ_3'), psi	5.1	10.4	
Effective Axial Stress (σ_1'), psi	18.0	28.2	
Pore Pressure (μ), psi	48.0	56.4	
Strain, %	3.7	3.4	
Remarks	Multistage Test (CU) Consolidated		
Undrained with pore pressure measurements.			

Sample Index Properties	
Natural Dry Density, pcf	64
Natural Moisture Content, %	64
Liquid Limit, %	51
Plasticity Index, %	32
Percent Gravel	-
Percent Sand	-
Percent Passing No. 200 Sieve	99

Sample Description Fat Clay (CH)   Sample Location B-6 @ 14'

Project No. 1080092   Triaxial Compression Test   Figure 19

TABLE I

SUMMARY OF LABORATORY TEST RESULTS

PROJECT NUMBER 1080092

SAMPLE LOCATION		NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (PCF)	GRADATION			ATTERBERG LIMITS		UNCONFINED COMPRESSIVE STRENGTH (PSF)	WATER SOLUBLE SULFATE (ppm)	SAMPLE CLASSIFICATION
BORING	DEPTH (FEET)			GRAVEL (%)	SAND (%)	SILT/ CLAY (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)			
B-1A	9	15	120			32					Clayey Sand
B-3	4	3	112			67					Slate
B-4	4	37	86			99	47	26			Lean Clay
	14	10	129	35	56	9					Poorly-graded Sand with Silt and Gravel
	19	37	82			92					Lean Clay
	39	38	81			91	35	17			Lean Clay
	49	37	85			93					Lean Clay
	79	14	117			40					Clayey Sand
B-5	4	20	112			40					Clayey Sand
	14	11	123	5	89	6					Well-graded Sand with Silt
	54	34	90			58					Sandy Lean Clay
	59	22	106			34					Silty Sand
B-6	14 (1)	64	64			99					Fat Clay
	14 (2)	62	63			98	51	32			Fat Clay
	19	18	111			20					Silty Sand
B-7	9	49	72			79					Lean Clay with Sand
	14	13	115			9					Poorly-graded Sand with Silt

TABLE I

SUMMARY OF LABORATORY TEST RESULTS

PROJECT NUMBER 1080092

SAMPLE LOCATION		NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (PCF)	GRADATION			ATTERBERG LIMITS		UNCONFINED COMPRESSIVE STRENGTH (PSF)	WATER SOLUBLE SULFATE (ppm)	SAMPLE CLASSIFICATION
TEST PIT	DEPTH (FEET)			GRAVEL (%)	SAND (%)	SILT/ CLAY (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)			
TP-2	6"	21	99			90	40	20			Lean Clay
TP-4	2½	23	98			45	24	10			Interlayered Lean Clay and Sandy Silt with Cemented Particles

APPENDIX

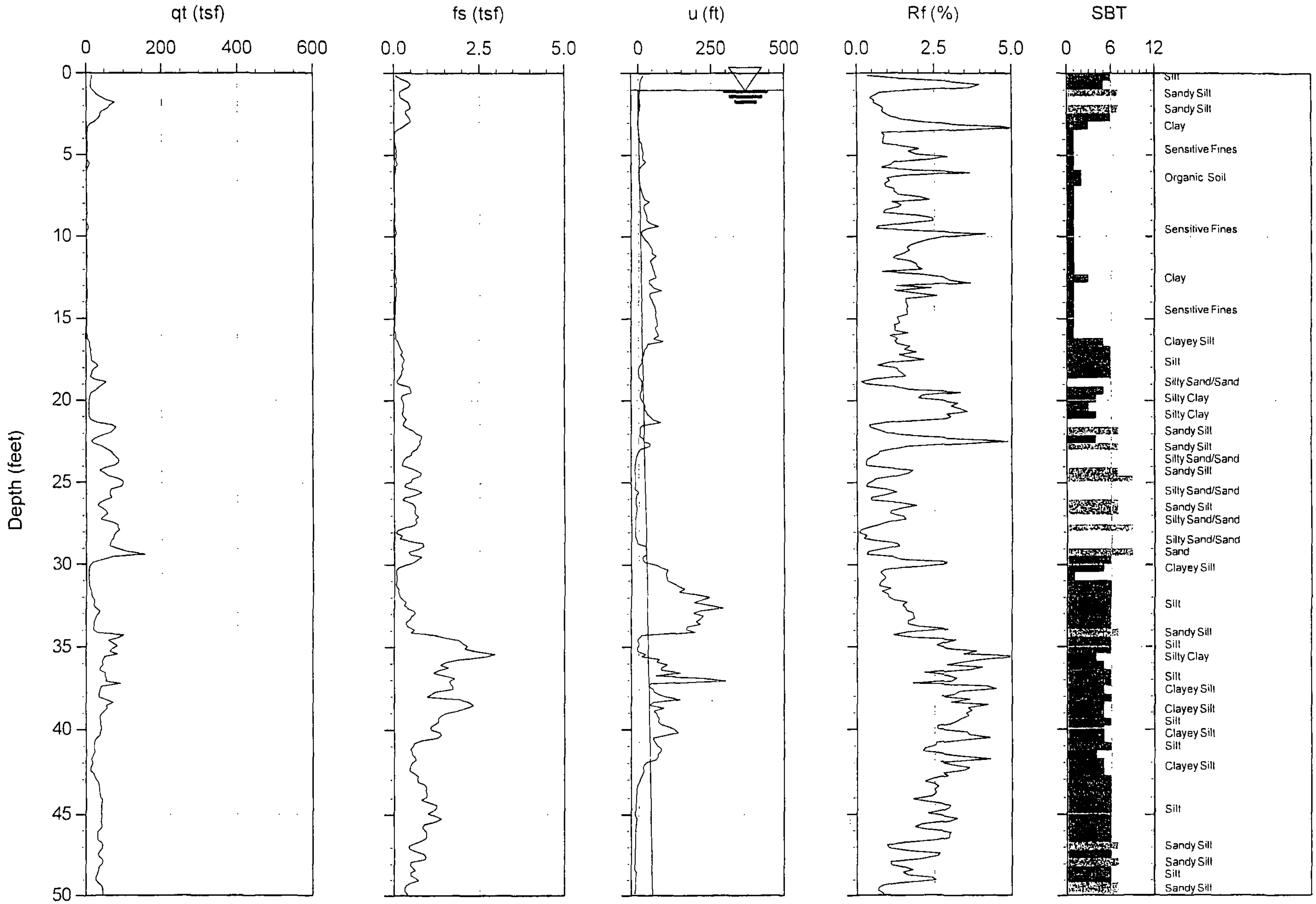
CONE PENETRATION TEST RESULTS

ConeTec

AGEC

Job No: 08-374
Date: 04:30:08 16:07
Site: MOULDING SITE

Sounding: CPT-01A
Cone: STD 20T AD183



Max Depth: 29.250 m / 95.96 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.150 m

File: 374CP01A.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997

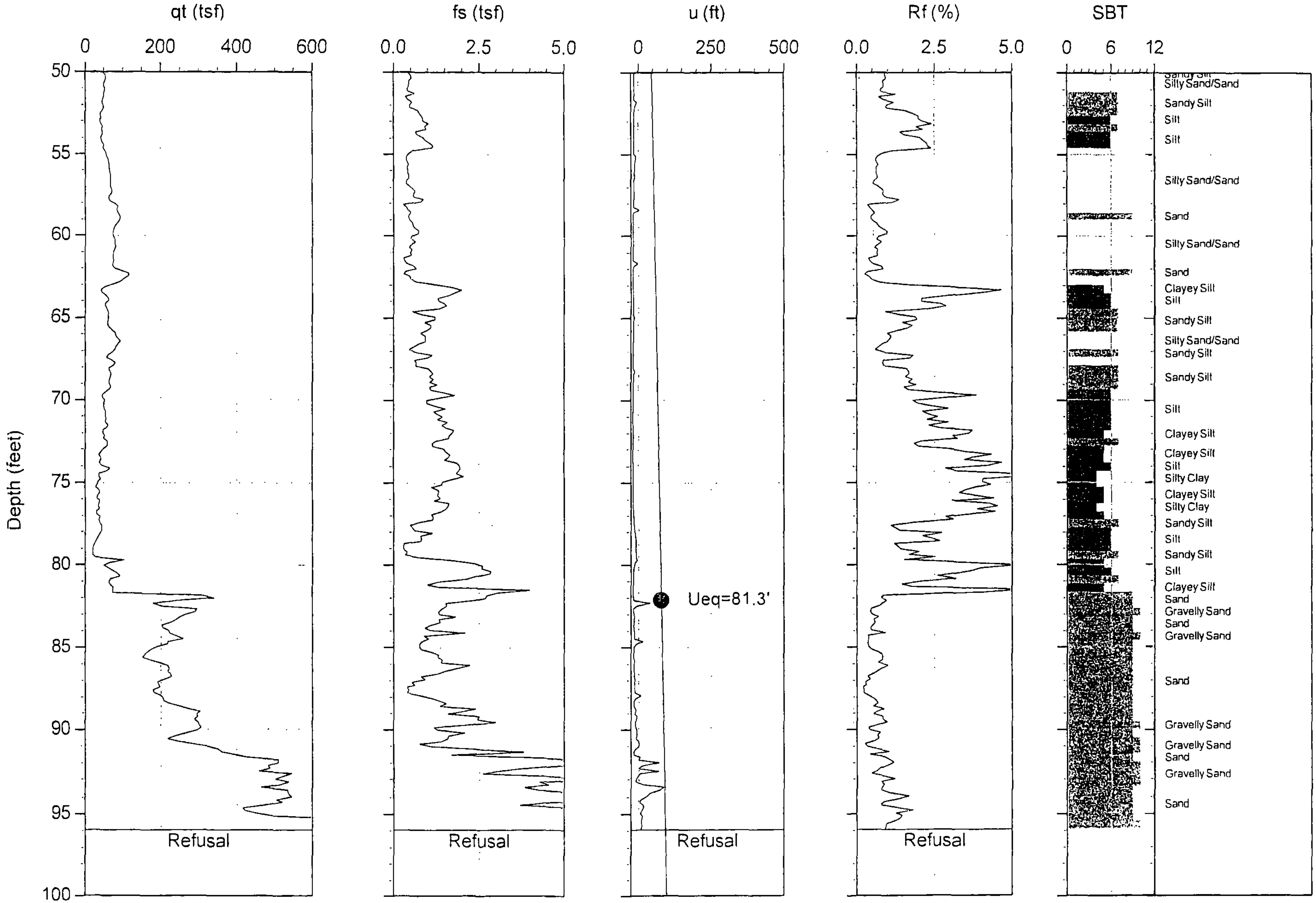
Equilibrium Pore Pressure from Dissipation

CONETEC

AGEC

Job No: 08-374
Date: 04:30:08 16:07
Site: MOULDING SITE

Sounding: CPT-01A
Cone: STD 20T AD183



Max Depth: 29.250 m / 95.96 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.150 m

File: 374CP01A.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997

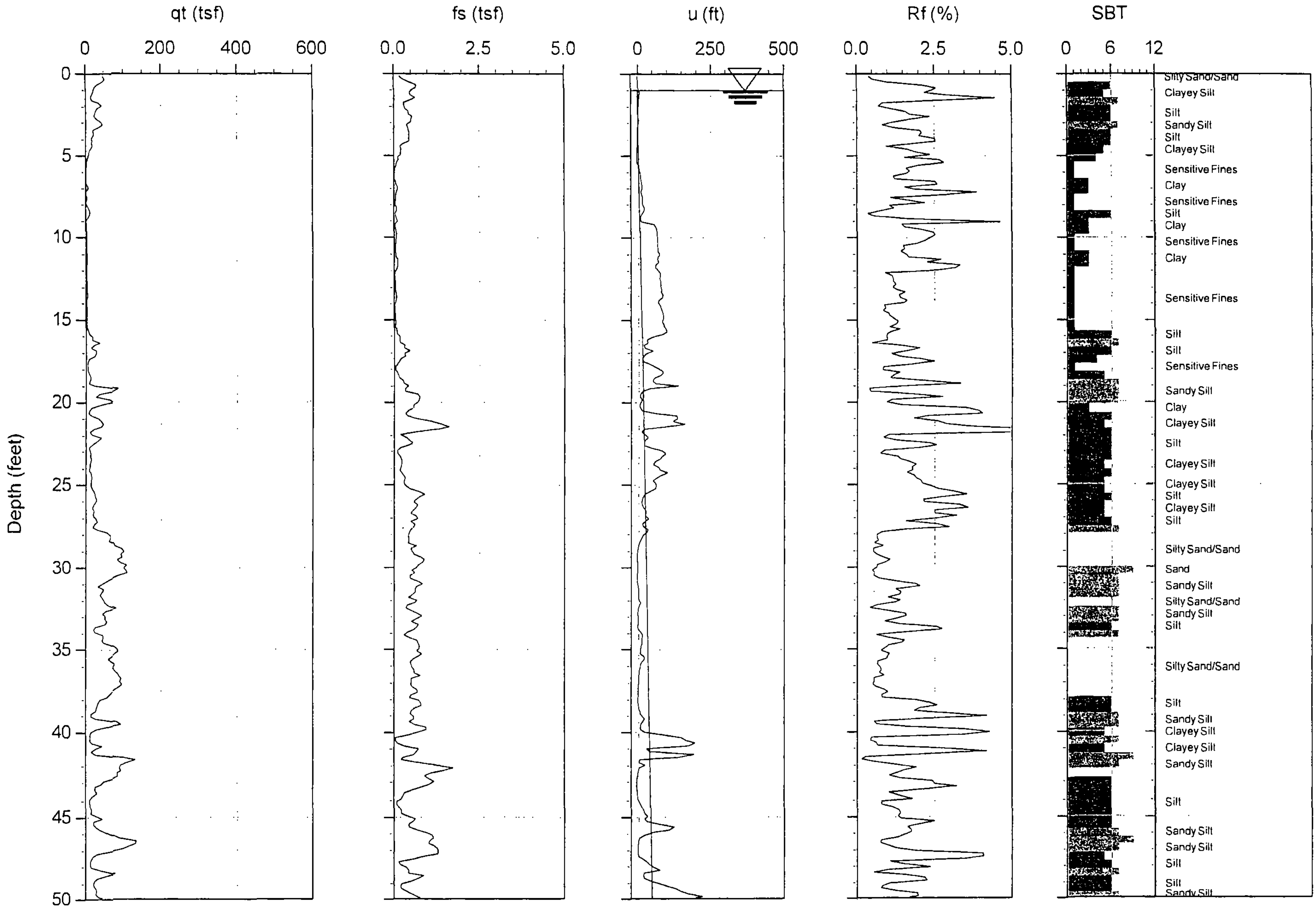
Equilibrium Pore Pressure from Dissipation

CONETEC

AGEC

Job No: 08-374
Date: 04:30:08 14:19
Site: MOULDING SITE

Sounding: CPT-02
Cone: STD 20T AD183



Max Depth: 48.800 m / 160.10 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.150 m

File: 374CP02.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997

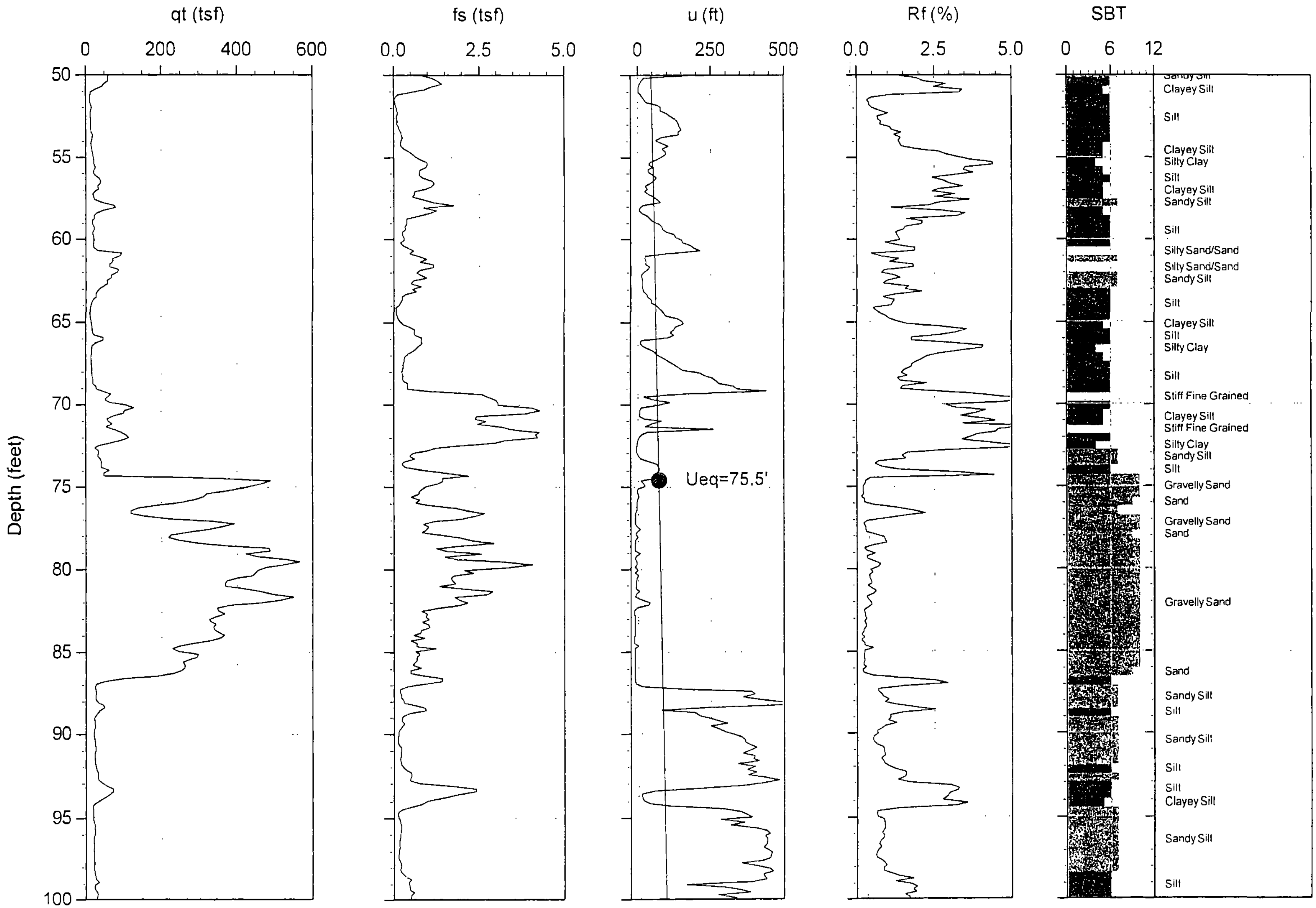
Equilibrium Pore Pressure from Dissipation

CONETEC

AGEC

Job No: 08-374
Date: 04:30:08 14:19
Site: MOULDING SITE

Sounding: CPT-02
Cone: STD 20T AD183



Max Depth: 48.800 m / 160.10 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.150 m

File: 374CP02.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997

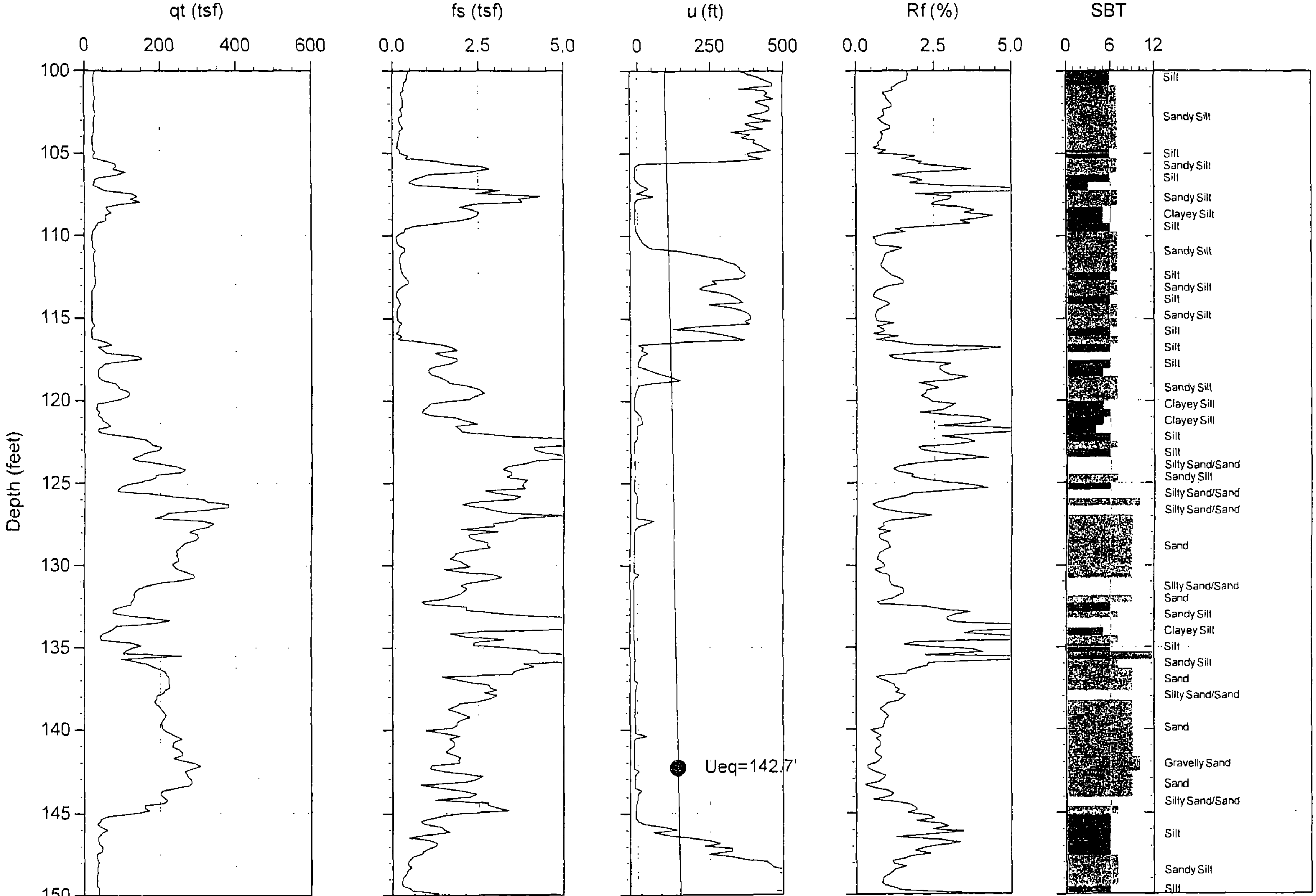
Equilibrium Pore Pressure from Dissipation

CONETEC

AGEC

Job No: 08-374
Date: 04:30:08 14:19
Site: MOULDING SITE

Sounding: CPT-02
Cone: STD 20T AD183



Max Depth: 48.800 m / 160.10 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.150 m

File: 374CP02.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997

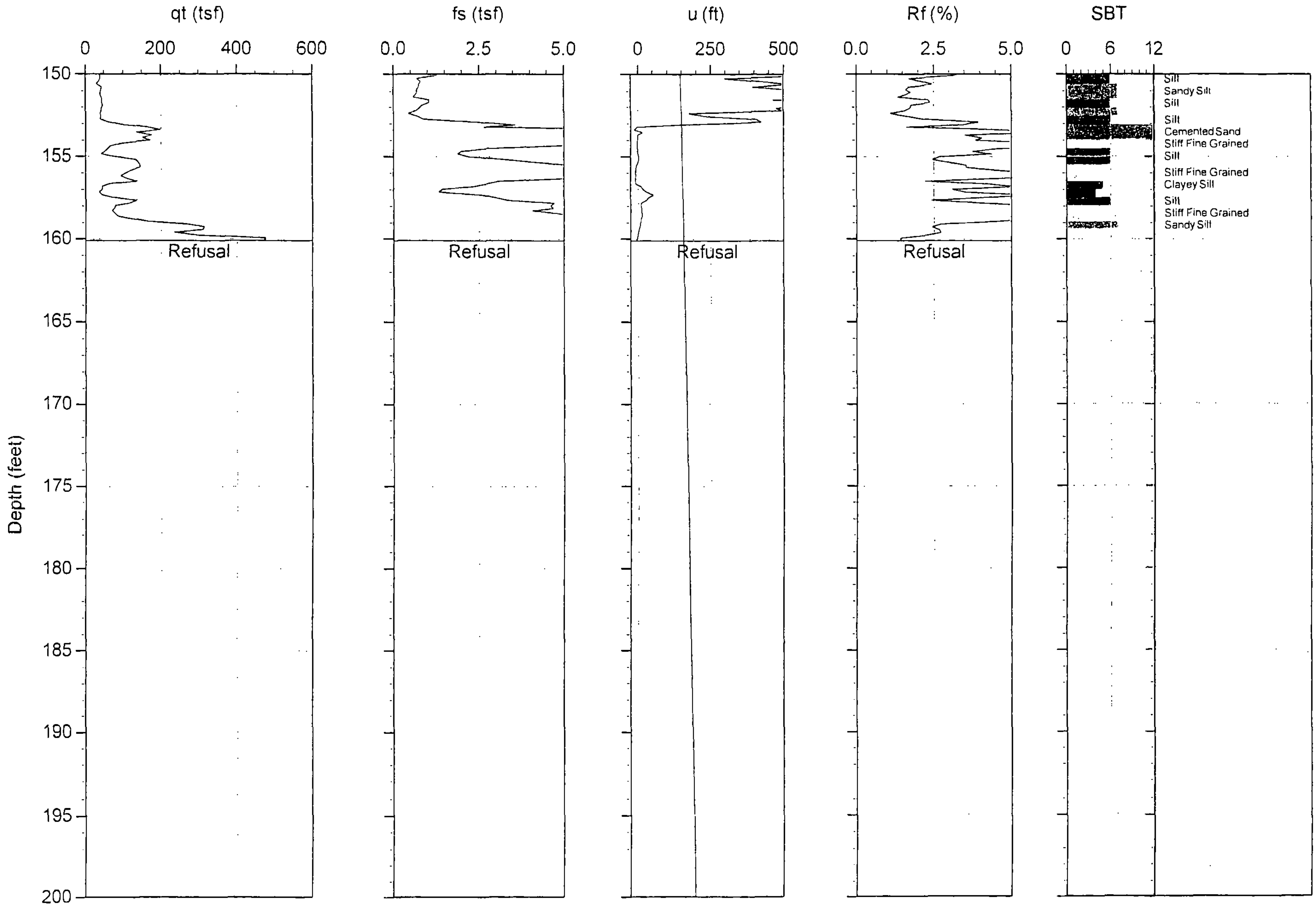
Equilibrium Pore Pressure from Dissipation

CONETEC

AGEC

Job No: 08-374
Date: 04:30:08 14:19
Site: MOULDING SITE

Sounding: CPT-02
Cone: STD 20T AD183



Max Depth: 48.800 m / 160.10 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.150 m

File: 374CP02.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997

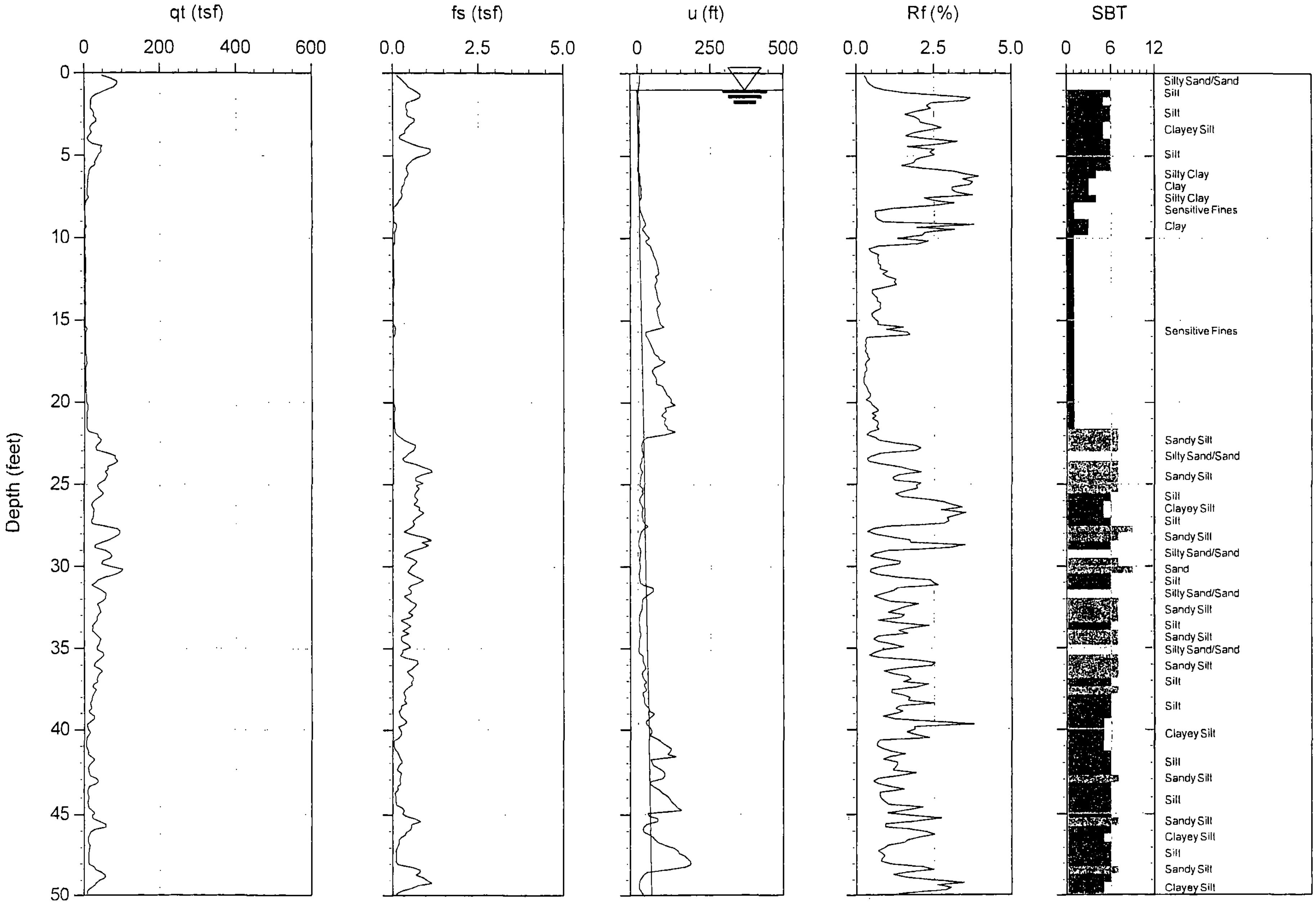
● Equilibrium Pore Pressure from Dissipation

CONETEC

AGEC

Job No: 08-374
Date: 04:30:08 11:13
Site: MOULDING SITE

Sounding: CPT-03
Cone: STD 20T AD183



Max Depth: 26.650 m / 87.43 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.150 m

File: 374CP03.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997

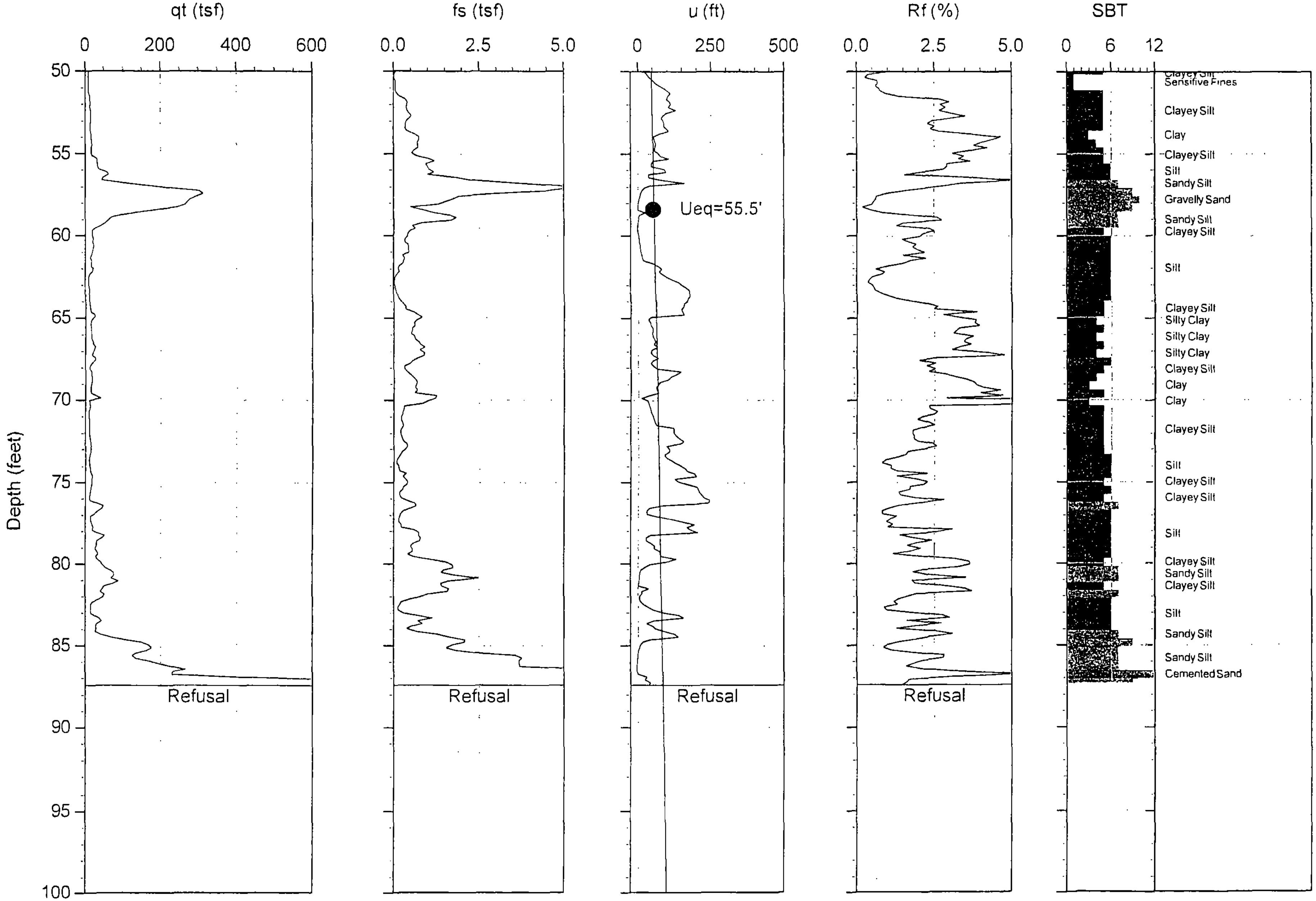
Equilibrium Pore Pressure from Dissipation

CONETEC

AGEC

Job No: 08-374
Date: 04:30:08 11:13
Site: MOULDING SITE

Sounding: CPT-03
Cone: STD 20T AD183



Max Depth: 26.650 m / 87.43 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.150 m

File: 374CP03.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997

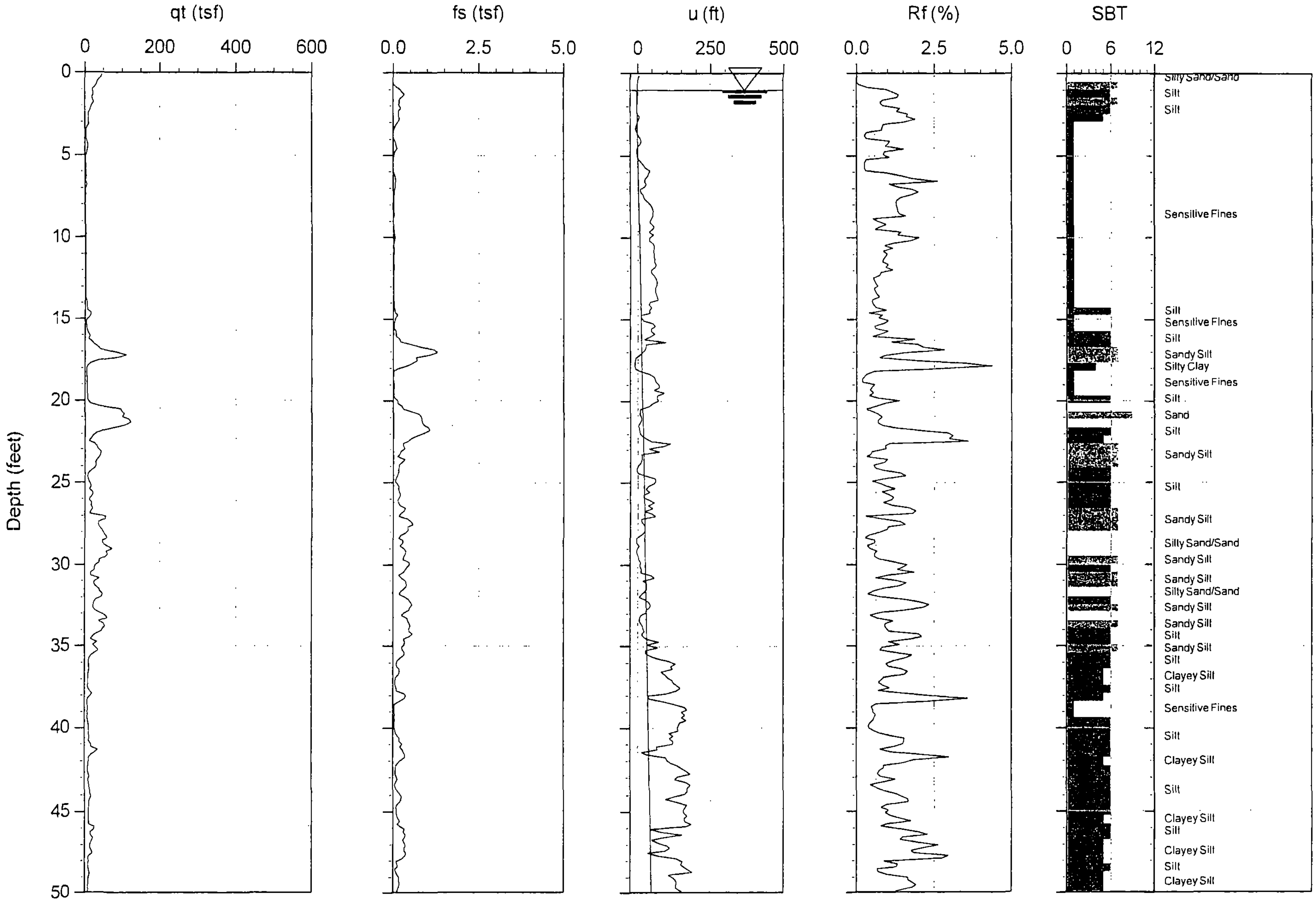
Equilibrium Pore Pressure from Dissipation

CONETEC

AGEC

Job No: 08-374
Date: 04:30:08 12:33
Site: MOULDING SITE

Sounding: CPT-04
Cone: STD 20T AD183



Max Depth: 42.850 m / 140.58 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.150 m

File: 374CP04.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997

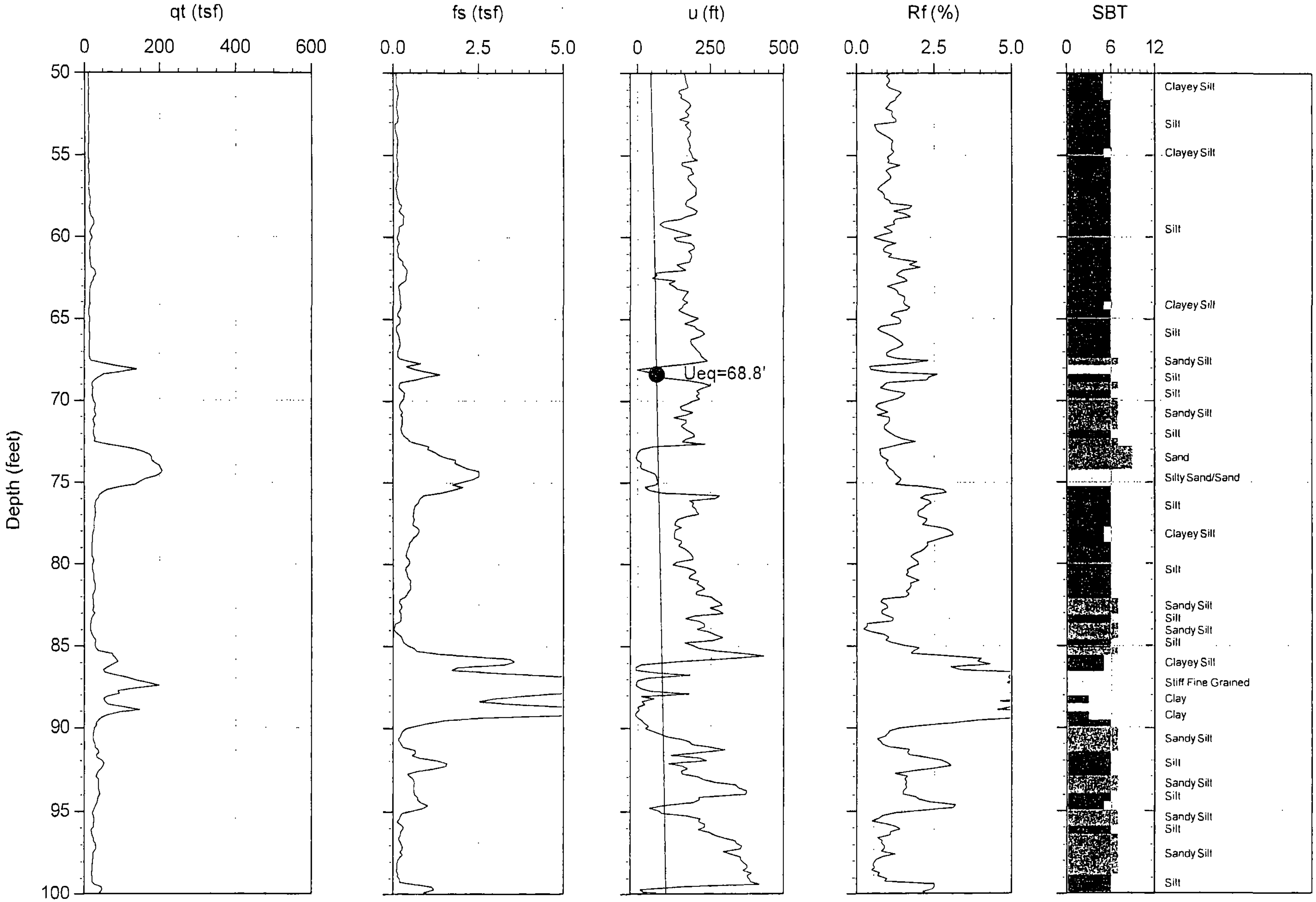
Equilibrium Pore Pressure from Dissipation

CONETEC

AGEC

Job No: 08-374
Date: 04:30:08 12:33
Site: MOULDING SITE

Sounding: CPT-04
Cone: STD 20T AD183



Max Depth: 42.850 m / 140.58 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.150 m

File: 374CP04.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997

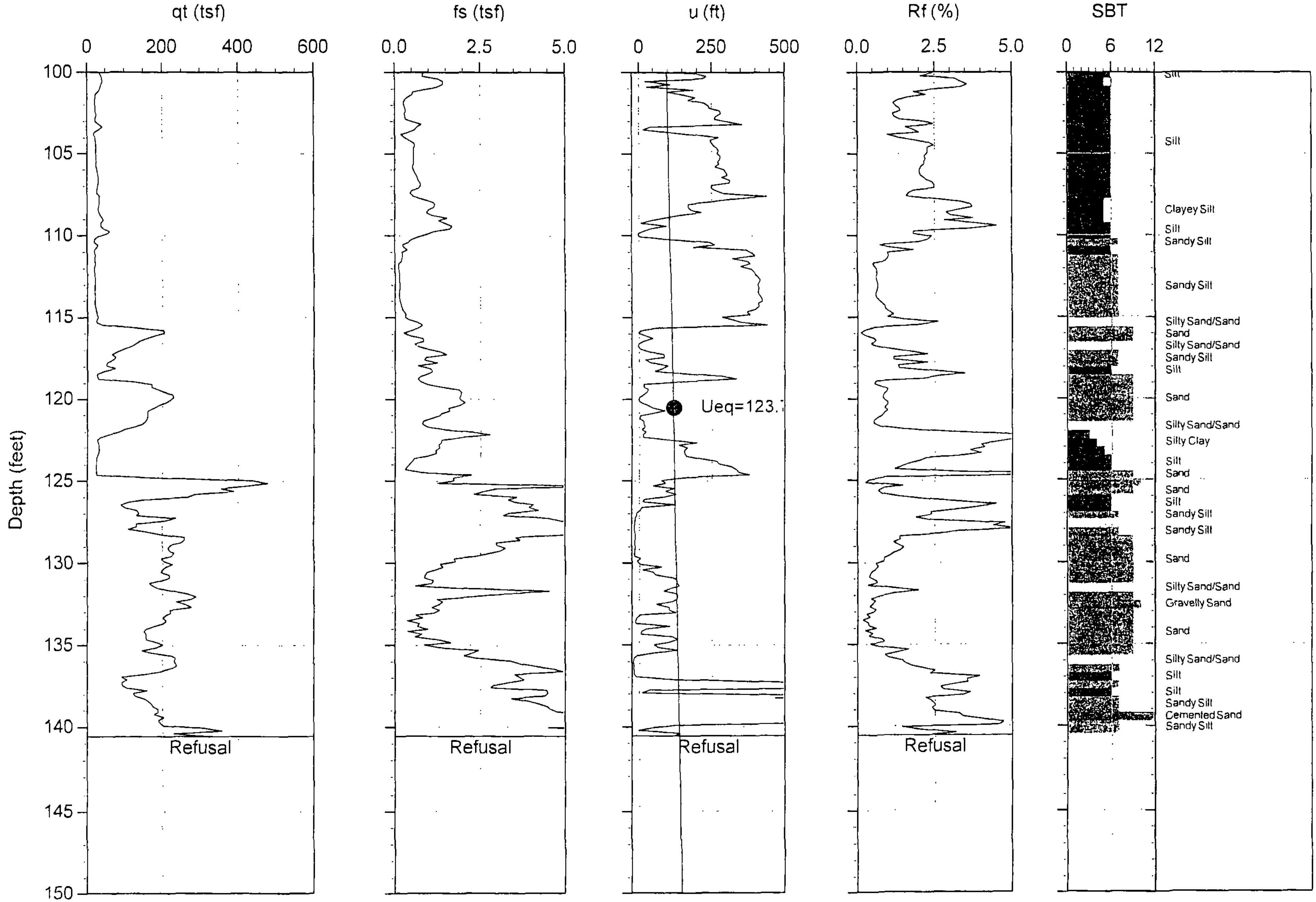
Equilibrium Pore Pressure from Dissipation

CONETEC

AGEC

Job No: 08-374
Date: 04:30:08 12:33
Site: MOULDING SITE

Sounding: CPT-04
Cone: STD 20T AD183



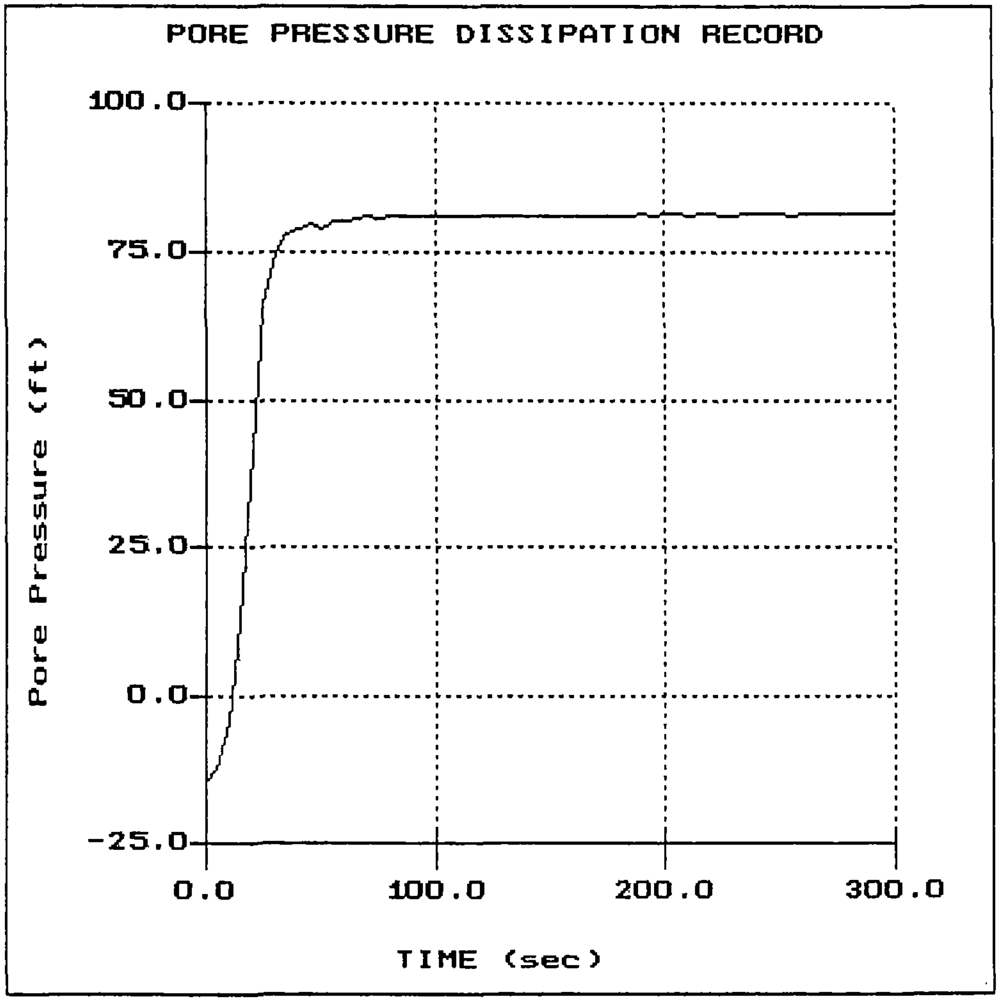
Max Depth: 42.850 m / 140.58 ft
Depth Inc: 0.050 m / 0.164 ft
Avg Int: 0.150 m

File: 374CP04.COR
Unit Wt: SBT Chart Soil Zones

SBT: Lunne, Robertson and Powell, 1997

Equilibrium Pore Pressure from Dissipation

AGEC	Sounding: CPT-01A Site:MOULDING SITE	Cone:STD 20T AD183 Date:04:30:08 16:07



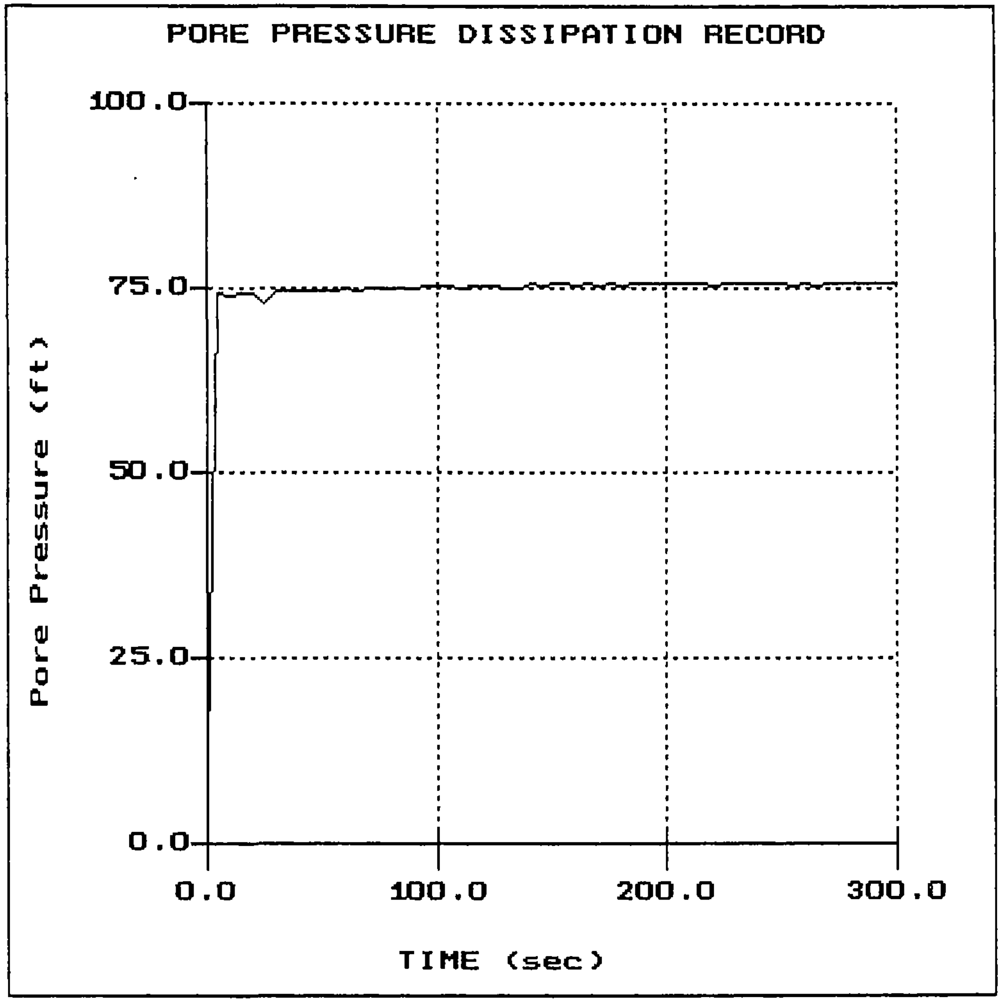
File: 374CP01A.PPD
Depth (m): 25.05
(ft): 82.19
Duration : 300.0s
U-min: -14.50 0.0s
U-max: 81.51 295.0s

AGEC

Sounding: CPT-02
Site:MOULDING SITE

Cone:STD 20T   AD183
Date:04:30:08   14:19

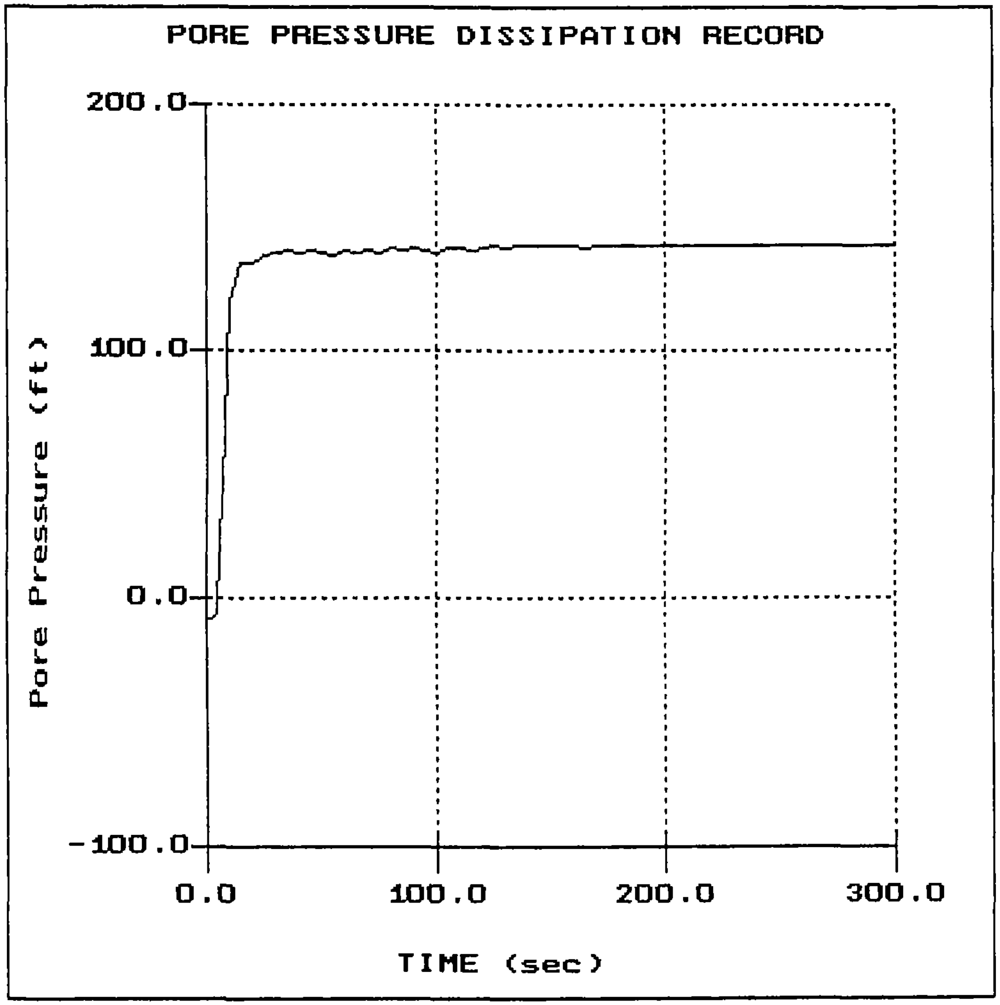
File: 374CP02.PPD
Depth (m): 22.75
(ft): 74.64
Duration : 300.0s
U-min: 9.64   0.0s
U-max: 75.57 295.0s



AGEC

Sounding: CPT-02
Site:MOULDING SITE

Cone:STD 20T AD183
Date:04:30:08 14:19

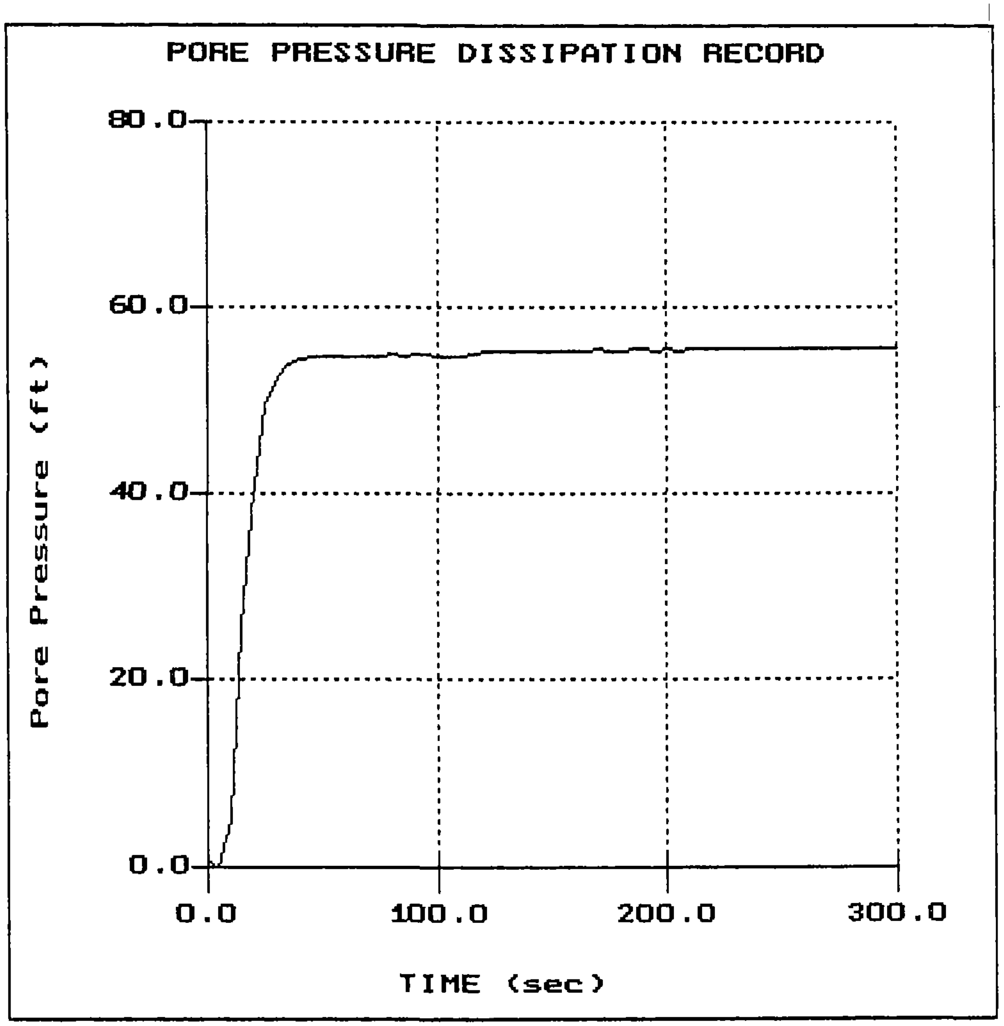


File: 374CP02.PPD
Depth (m): 43.40
(ft): 142.39
Duration : 300.0s
U-min: -9.27 0.0s
U-max: 143.15 275.0s

AGEC

Sounding: CPT-03
Site:MOULDING SITE

Cone:STD 20T AD183
Date:04:30:08 11:13



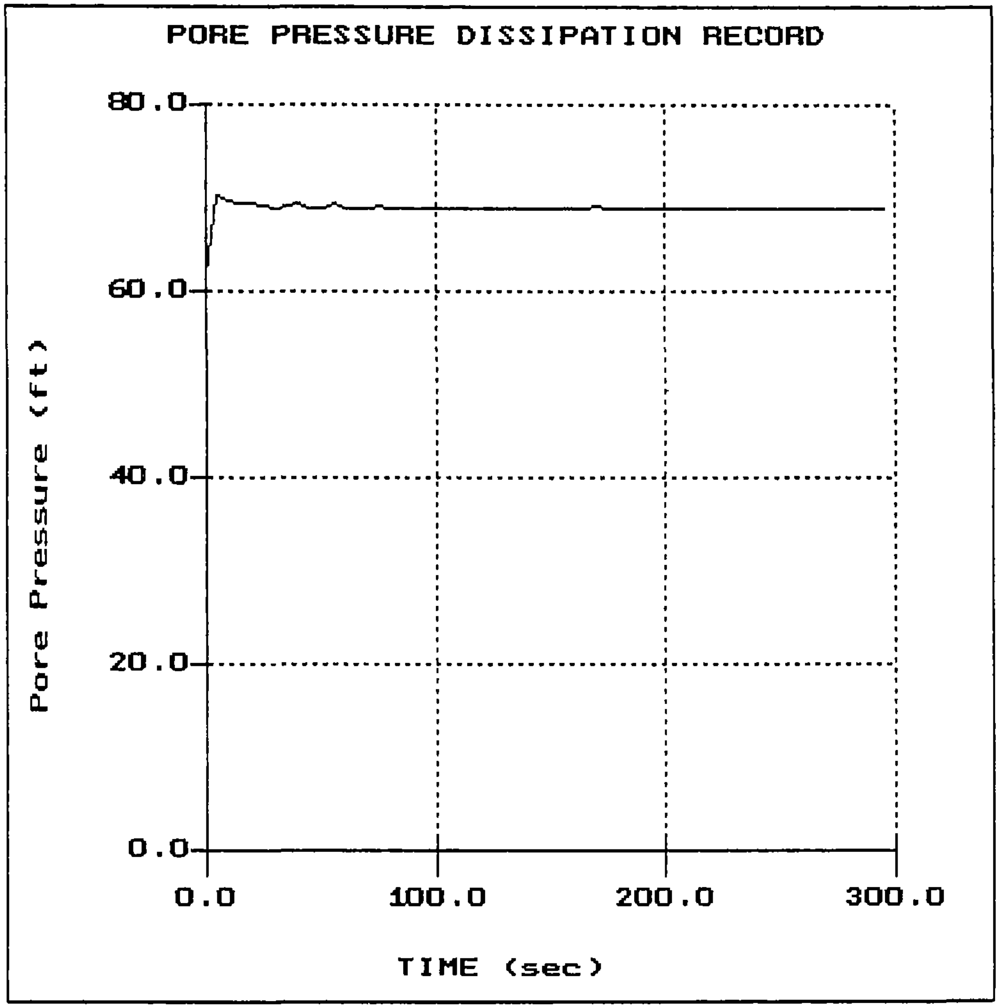
File: 374CP03.PPD
Depth (m): 17.80
(ft): 58.40
Duration : 300.0s
U-min: -0.33 5.0s
U-max: 55.52 300.0s

AGEC

Sounding: CPT-04
Site:MOULDING SITE

Cone:STD 20T AD183
Date:04:30:08 12:33

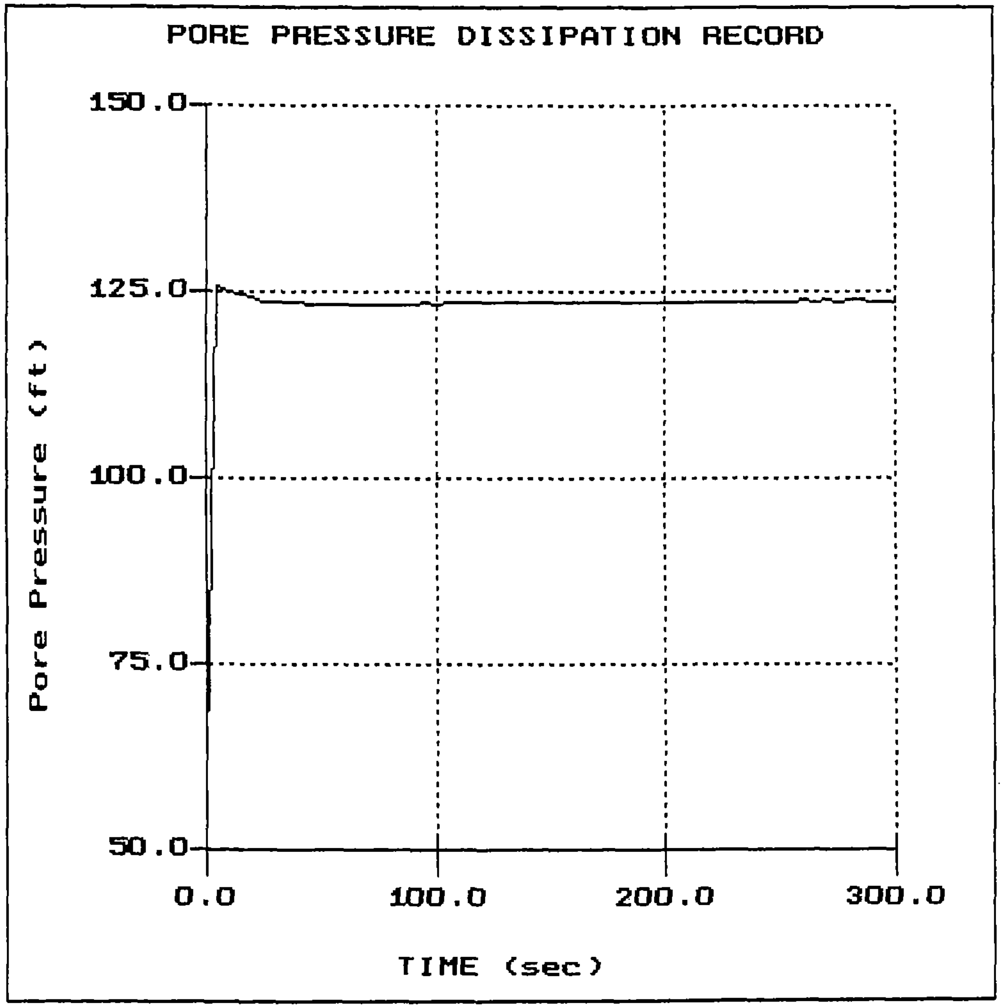
File: 374CP04.PPD
Depth (m): 20.85
(ft): 68.41
Duration : 295.0s
U-min: 61.34 0.0s
U-max: 70.35 5.0s



AGEC

Sounding: CPT-04
Site:MOULDING SITE

Cone:STD 20T AD183
Date:04:30:08 12:33



File: 374CP04.PPD
Depth (m): 36.75
(ft): 120.57
Duration : 300.0s
U-min: 60.58 0.0s
U-max: 125.68 5.0s

Applied Geotechnical Engineering Consultants, Inc.

December 4, 2008

Moulding and Sons
c/o Hansen Allen & Luce, Inc.
6771 South 900 East
Midvale, UT 84047

Attention: Kent Staheli
FAX: 566-5581

Subject: Geologic Conditions
Proposed Landfill
10500 West 900 South
Plain City, Utah
AGEC Project No. 1080092

Gentlemen:

Applied Geotechnical Engineering Consultants, Inc. was requested to provide a description of the geology for the proposed landfill to be constructed at 10500 West 900 South in Plain City, Utah. We previously performed a geotechnical investigation and submitted our findings and recommendations in a report dated November 11, 2008 under Project No. 1080092.

GEOLOGIC AND SEISMIC TECTONIC SETTING

A. Regional Geology

The site is located at the northeast end of the Great Salt Lake which is located in the Basin and Range physiographic province. The province is made up of north/south elongated mountain blocks and valleys.

The area in and around the Great Salt Lake was once occupied by a large lake known as Lake Bonneville during the Wisconsin Glacial Period of the Pleistocene Age. The present-day Great Salt Lake is a remnant of ancient Lake Bonneville. The stillstands of Lake Bonneville formed benches along the Wasatch Front. The highest level of Lake Bonneville is marked by a bench, the Bonneville shoreline, at approximate elevation 5200 feet. The lake remained at this high level from approximately 17,000 to 15,000 years before present until it dropped approximately 350 feet during a catastrophic flood known as the Bonneville Flood (Currey and Oviatt, 1985, Jarrett and Malde, 1987). Two lower stillstands of Lake Bonneville are the Provo and Gilbert, which formed at approximate elevations of 4800 and 4250 feet, respectively (Personius and Scott, 1992). The lake has remained near its present-day level through most of Holocene time. The elevation of the site is just above the historic high level of the Great Salt Lake.

B. Tectonic Setting

The site is located near the eastern side of the Basin and Range physiographic province adjacent the Wasatch mountains. The Wasatch mountains are bounded on the west by the Wasatch fault zone which extends approximately 240 miles from near Malad, Idaho to the vicinity of Fayette, Utah. Relatively recent fault movements of the Wasatch fault zone are evidenced by offsets in Lake Bonneville sediments and more recent alluvial and colluvial deposits.

The Wasatch fault zone is considered to be made up of several segments, each segment acting relatively independently (Machette and others, 1987). The site is located approximately 14 miles west of the Weber segment of the Wasatch fault zone. There is another potentially active fault in the East Great Salt Lake fault, which extends along the west side of Antelope Island and Promontory Point. This fault is located approximately 11 miles to the southwest. This is the closest known, potentially active fault to the site (Black and others, 2003). Both of these faults show evidence of movement during Holocene time and, thus, are considered potentially active. The Weber segment of the Wasatch fault zone is considered to potentially produce earthquakes as great as 7.2 moment magnitude and the east Great Salt Lake fault is considered to be able to produce a 6.9 moment magnitude earthquake (Wong and others, 2002).

C. Site Geology

The site is located on the southern end of Little Mountain which is a hill which exposes bedrock. This bedrock was mapped by Christie-Blick, 1985, as consisting of rock from the Perry Canyon Formation. This bedrock is exposed along the north and west edges of the property. The bedrock at the site consists of diamictite and slate as described in the above-referenced geotechnical report. The diamictite in this area generally dips down toward the northwest at approximately 7 to 10 degrees. Based on the results of our subsurface investigation, there is a significant amount of sand and clay which overlies the bedrock in most of the area planned for landfilling. These soils consist of Lake Bonneville sediments which are interpreted to be both deep lake and near shore deposits.

GEOLOGIC HAZARDS

The geologic hazards which were identified during the original study which may affect the site are primarily limited to strong earthquake ground shaking and the potential for liquefaction and possibly lateral spread. These conditions are described in the above-referenced geotechnical report. Surface fault rupture, rockfall, landslide and debris flow are not considered potential hazards at the site.

If you have questions or if we can be of further service, please call.

Sincerely,

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, INC.

11/4/08

Douglas R. Hawkes, P.E., P.G.

Reviewed by SM, P.G.
DRH/dc

References

Black, B.D., Hecker, S., Hylland, M.D., Christenson, G.E., and McDonald, G.N., 2003; Quaternary fault and fold database and map of Utah; Utah Geological Survey Map 193DM.

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References (continued)

Machette, M.N., Personius, S.F., and Nelson, A.R., 1987, Quaternary geology along the Wasatch Fault Zone - segmentation, recent investigations and preliminary conclusions; U.S. Geological Survey Open File Report 87-585 p B1 - B124.

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Wong, I., Silva, W., Olig, S., Thomas, P., Wright, D., Ashland, F., Gregor, N., Pechmann, J., Dober, M., Christenson, C. and Gerth, R., 2002; Earthquake scenario and probabilistic ground shaking maps for Salt Lake City, Utah, metropolitan area; Utah Geological Survey Miscellaneous Publication MP-02-5.

APPENDIX 3

GROUNDWATER QUALITY ANALYSIS

INORGANIC ANALYSIS REPORT

Client: Hansen, Allen & Luce Contact: Kent Staheli
Project ID: Moulding C & D Landfill

AMERICAN WEST ANALYTICAL LABORATORIES

Lab Sample ID: L84598-01E
Field Sample ID: **B-4**
Collected: 6/17/2008 6:05:00 PM
Received: 6/18/2008

463 West 3600 South
Salt Lake City, Utah
84115

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Fax (801) 263-8687
-mail: awal@awal-labs.com

Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

TOTAL METALS

Analytical Results	Units	Date Analyzed	Method Used	Reporting Limit	Analytical Results	
Antimony	mg/L	6/21/2008 5:39:38 AM	6020	0.0010	< 0.0010	
Arsenic	mg/L	6/21/2008 5:39:38 AM	6020	0.00060	**0.027**	
Barium	mg/L	6/21/2008 5:39:38 AM	6020	0.00040	**1.0**	
Beryllium	mg/L	6/21/2008 5:39:38 AM	6020	0.00060	< 0.00060	
Cadmium	mg/L	6/21/2008 5:39:38 AM	6020	0.00018	**0.00052**	
Calcium	mg/L	6/27/2008 5:14:00 PM	6010B	10	**280**	2 ~
Chromium	mg/L	6/27/2008 6:31:00 PM	6010B	0.010	**0.010**	
Cobalt	mg/L	6/21/2008 5:39:38 AM	6020	0.0012	**0.0071**	
Copper	mg/L	6/21/2008 5:39:38 AM	6020	0.00080	**0.038**	
Iron	mg/L	6/27/2008 6:31:00 PM	6010B	0.050	**13**	2
Lead	mg/L	6/21/2008 5:39:38 AM	6020	0.00040	**0.0077**	
Magnesium	mg/L	6/27/2008 5:14:00 PM	6010B	10	**450**	2 ~
Manganese	mg/L	6/21/2008 5:39:38 AM	6020	0.0012	**0.53**	1
Mercury	mg/L	6/20/2008 11:52:35 AM	7470A	0.00020	< 0.00020	
Nickel	mg/L	6/21/2008 5:39:38 AM	6020	0.00080	**0.090**	
Potassium	mg/L	6/27/2008 5:14:00 PM	6010B	10	**410**	2 ~
Selenium	mg/L	6/21/2008 5:39:38 AM	6020	0.00080	< 0.00080	
Silver	mg/L	6/21/2008 5:39:38 AM	6020	0.00040	< 0.00040	
Sodium	mg/L	6/27/2008 4:12:00 PM	6010B	100	**8600**	2 ~
Thallium	mg/L	6/21/2008 5:39:38 AM	6020	0.00040	**0.00086**	
Vanadium	mg/L	6/27/2008 6:31:00 PM	6010B	0.0050	**0.023**	
Zinc	mg/L	6/21/2008 5:39:38 AM	6020	0.0054	**0.050**	

1 - *Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.*

2 - *Analyte concentration is too high for accurate matrix spike recovery and/or RPD.*

~ - *The reporting limits were raised due to high analyte concentrations.*

INORGANIC ANALYSIS REPORT

Client: Hansen, Allen & Luce　　Contact: Kent Staheli
Project ID: Moulding C & D Landfill

AMERICAN WEST ANALYTICAL LABORATORIES

Lab Sample ID: L84598-01
Field Sample ID: **B-4**
Collected: 6/17/2008 6:05:00 PM
Received: 6/18/2008

463 West 3600 South
Salt Lake City, Utah
84115

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Toll Free (888) 263-8686
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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Analytical Results	Units	Date Analyzed	Method Used	Reporting Limit	Analytical Result	
Ammonia (as N)	mg/L	6/26/2008 12:12:00 PM	350.1	0.050	**2.9**	
Bicarbonate (As CaCO3)	mg/L	6/19/2008 10:15:00 AM	2320B	20	**180**	
Carbonate (As CaCO3)	mg/L	6/19/2008 10:15:00 AM	2320B	10	< 10	
Chloride	mg/L	6/27/2008 5:04:09 AM	300.0	500	**15000**	
COD	mg/L	6/20/2008 10:30:00 AM	HACH 8000	100	**1100**	
Nitrate (as N)	mg/L	6/18/2008 1:37:00 PM	353.2	0.010	**0.034**	'@
pH @ 25° C	pH Units	6/18/2008 7:00:00 PM	4500H+B	1.00	**7.60**	**H**
Sulfate	mg/L	6/27/2008 3:07:43 AM	300.0	750	**1200**	
TDS	mg/L	6/19/2008 12:30:00 PM	160.1	100	**29000**	
Total Organic Carbon	mg/L	6/26/2008 5:32:00 AM	5310B	1.0	**7.4**	

' - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.
@ - High RPD due to suspected sample non-homogeneity or matrix interference.
H - Sample was received outside of the holding time.

INORGANIC ANALYSIS REPORT

Client: Hansen, Allen & Luce   Contact: Kent Staheli

Project ID: Moulding C & D Landfill

AMERICAN WEST ANALYTICAL LABORATORIES

Lab Sample ID: L84598-03E

Field Sample ID: B-7

Collected: 6/17/2008 6:28:00 PM

Received: 6/18/2008

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

TOTAL METALS

Analytical Results	Units	Date Analyzed	Method Used	Reporting Limit	Analytical Results	
Antimony	mg/L	6/21/2008 6:06:39 AM	6020	0.0010	< 0.0010	
Arsenic	mg/L	6/21/2008 6:06:39 AM	6020	0.00060	**0.0097**	
Barium	mg/L	6/21/2008 6:06:39 AM	6020	0.00040	**3.8**	
Beryllium	mg/L	6/21/2008 6:06:39 AM	6020	0.00060	< 0.00060	
Cadmium	mg/L	6/21/2008 6:06:39 AM	6020	0.00018	**0.00028**	
Calcium	mg/L	6/27/2008 5:29:00 PM	6010B	10	**230**	~
Chromium	mg/L	6/27/2008 6:48:00 PM	6010B	0.010	< 0.010	
Cobalt	mg/L	6/21/2008 6:06:39 AM	6020	0.0012	**0.0048**	
Copper	mg/L	6/21/2008 6:06:39 AM	6020	0.00080	**0.025**	
Iron	mg/L	6/27/2008 6:48:00 PM	6010B	0.050	**5.7**	
Lead	mg/L	6/21/2008 6:06:39 AM	6020	0.00040	**0.0050**	
Magnesium	mg/L	6/27/2008 5:29:00 PM	6010B	10	**440**	~
Manganese	mg/L	6/21/2008 6:06:39 AM	6020	0.0012	**0.63**	
Mercury	mg/L	6/20/2008 12:01:04 PM	7470A	0.00020	< 0.00020	
Nickel	mg/L	6/21/2008 6:06:39 AM	6020	0.00080	**0.083**	
Potassium	mg/L	6/27/2008 5:29:00 PM	6010B	10	**330**	~
Selenium	mg/L	6/21/2008 6:06:39 AM	6020	0.00080	< 0.00080	
Silver	mg/L	6/21/2008 6:06:39 AM	6020	0.00040	< 0.00040	
Sodium	mg/L	6/27/2008 4:54:00 PM	6010B	1000	**6700**	~
Thallium	mg/L	6/21/2008 6:06:39 AM	6020	0.00040	< 0.00040	
Vanadium	mg/L	6/27/2008 6:48:00 PM	6010B	0.0050	< 0.0050	
Zinc	mg/L	6/21/2008 6:06:39 AM	6020	0.0054	**0.023**	

~ - The reporting limits were raised due to high analyte concentrations.

INORGANIC ANALYSIS REPORT

AMERICAN WEST ANALYTICAL LABORATORIES

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Kyle F. Gross
Laboratory Director

Jose Rocha
QA Officer

Client: Hansen, Allen & Luce
Contact: Kent Staheli
Project ID: Moulding C & D Landfill

Lab Sample ID: L84598-03
Field Sample ID: B-7
Collected: 6/17/2008 6:28:00 PM
Received: 6/18/2008

Analytical Results	Units	Date Analyzed	Method Used	Reporting Limit	Analytical Result	
Ammonia (as N)	mg/L	6/26/2008 12:12:00 PM	350.1	0.050	**1.5**	
Bicarbonate (As CaCO3)	mg/L	6/19/2008 10:15:00 AM	2320B	40	**250**	
Carbonate (As CaCO3)	mg/L	6/19/2008 10:15:00 AM	2320B	10	< 10	
Chloride	mg/L	6/27/2008 7:47:07 AM	300.0	500	**12000**	
COD	mg/L	7/1/2008 1:00:00 PM	HACH 8000	100	**890**	1
Nitrate (as N)	mg/L	6/18/2008 1:37:00 PM	353.2	0.010	< 0.010	
pH @ 25° C	pH Units	6/18/2008 7:00:00 PM	4500H+B	1.00	**7.45**	**H**
Sulfate	mg/L	6/27/2008 7:00:33 AM	300.0	75	**730**	
TDS	mg/L	6/20/2008 4:30:00 PM	160.1	100	**23000**	
Total Organic Carbon	mg/L	6/26/2008 5:32:00 AM	5310B	1.0	**2.2**	

Matrix effect caused NO3 value to read negative. Corrected to zero.

H - Sample was received outside of the holding time.

1 - Matrix spike recovery indicates matrix interference. The method is in control as indicated by the LCS.

APPENDIX 4

HYDROLOGY

Purpose: To determine the design flows to use for the detention and around the facility.

Method: The SCS curve number method was used with the HEC-HMS hydrology model. Areas for the subbasins were determined using AutoCAD and ArcGIS.

Required: In order to calculate the runoff and runon the following steps and information are required:

- A delineation of the tributary area.
- A weighted or representative Soil Conservation Service(SCS) curve number (CN) for the tributary area.
- Lag time.
- Storm Distribution.
- 100 year-24 hour precipitation.
- 25 year-24 hour precipitation.

Delineation: The delineation of the subbasins, shown in the HMS storm water model figure, was based on the landfill design provided and USGS quad map contours for the runon basin.

Curve Numbers: The curve numbers were determined based on the hydrologic soil type and soil cover. The soil type in the area ranged from B to some D type soils. A type C soil was selected as representative of the area. The cover conditions were combined with the hydrologic soil type to produce a curve number based on Table 2-2d of Technical Release 55. The runoff from the closed landfill was determined to have a curve number of 81, using the herbaceous cover and Type C soil conditions. The runon basin from Little Mountain was determined to have a curve number of 63, using the fair cover sagebrush with grass understory and C type soils.

Precipitation: A 100 year - 24 hour event was used for the design storm, exceeding the State requirements of a 25 year event. The rainfall amounts were taken from the "Point Precipitation Frequency Estimates from NOAA Atlas 14". The 100 year - 24 hour storm was listed as 2.73 inches in NOAA Atlas 14. The 25 year - 24 hour storm was listed as 2.23 inches.

Distribution: The distribution used for the 24-hour event was the SCS Type II.

Lag Time: The lag times were calculated by using the Time of Concentration and the equation $T_L = 0.6Tc$. Tc was calculated using Worksheet 3 in TR-55. A spreadsheet showing each subbasin is provided and are labeled with their subbasin name. The runon subbasin was calculated using a method from a study by Simas and Hawkins, "Lag Time Characteristics for Small Watersheds in the U.S."

Results: The results of the HEC-1 model run are summarized in the table entitled "Hydrology Output from HMS". The outflow from the lower detention out of the facility is 16.1 cfs with a total tributary area of 219 acres, including the landfill facility and runon from Little Mountain, producing 0.074 cfs/acre.

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

Utah 41.246455 N 112.232511 W 4202 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006

Extracted: Thu May 8 2008

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.12	0.18	0.23	0.31	0.38	0.48	0.55	0.73	0.92	1.12	1.29	1.47	1.70	1.87	2.34	2.78	3.37	3.96
2	0.15	0.23	0.29	0.39	0.48	0.60	0.68	0.89	1.12	1.37	1.58	1.81	2.08	2.30	2.88	3.42	4.14	4.86
5	0.21	0.32	0.40	0.53	0.66	0.78	0.86	1.09	1.36	1.66	1.91	2.18	2.51	2.77	3.44	4.07	4.90	5.74
10	0.26	0.40	0.50	0.67	0.83	0.95	1.02	1.27	1.57	1.90	2.18	2.49	2.86	3.13	3.87	4.57	5.47	6.41
25	0.35	0.53	0.66	0.89	1.10	1.23	1.29	1.54	1.88	2.23	2.54	2.90	3.33	3.62	4.42	5.20	6.18	7.23
50	0.43	0.66	0.81	1.10	1.36	1.49	1.54	1.76	2.13	2.47	2.82	3.23	3.69	3.98	4.80	5.65	6.67	7.81
100	0.53	0.80	0.99	1.34	1.66	1.80	1.84	2.02	2.40	2.73	3.10	3.57	4.05	4.34	5.18	6.08	7.12	8.35
200	0.64	0.98	1.21	1.63	2.02	2.17	2.20	2.32	2.69	2.98	3.39	3.91	4.41	4.69	5.53	6.49	7.53	8.83
500	0.83	1.26	1.56	2.10	2.60	2.76	2.78	2.90	3.16	3.33	3.77	4.37	4.88	5.13	5.95	6.99	7.99	9.39
1000	0.99	1.51	1.88	2.53	3.13	3.30	3.32	3.42	3.54	3.60	4.06	4.72	5.24	5.45	6.24	7.33	8.27	9.74

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval
Please refer to the documentation for more information. NOTE: Formatting forces estimates near zero to appear as zero

*** Upper bound of the 90% confidence interval**
Precipitation Frequency Estimates (inches)

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.14	0.21	0.27	0.36	0.44	0.54	0.62	0.80	1.00	1.25	1.43	1.63	1.88	2.06	2.56	3.03	3.65	4.29
2	0.18	0.27	0.34	0.45	0.56	0.68	0.77	0.99	1.23	1.54	1.77	2.00	2.31	2.54	3.15	3.73	4.48	5.26
5	0.24	0.37	0.46	0.62	0.77	0.88	0.97	1.20	1.49	1.86	2.13	2.41	2.79	3.04	3.77	4.43	5.28	6.19
10	0.31	0.47	0.58	0.78	0.96	1.08	1.16	1.40	1.72	2.13	2.42	2.76	3.17	3.44	4.24	4.96	5.89	6.90
25	0.41	0.62	0.77	1.04	1.29	1.41	1.47	1.71	2.07	2.49	2.83	3.22	3.69	3.98	4.83	5.65	6.64	7.78
50	0.51	0.78	0.96	1.29	1.60	1.73	1.76	1.97	2.37	2.78	3.14	3.60	4.09	4.38	5.25	6.14	7.17	8.41
100	0.63	0.96	1.19	1.60	1.98	2.12	2.15	2.29	2.70	3.06	3.47	3.98	4.50	4.78	5.67	6.63	7.67	9.01
200	0.78	1.19	1.47	1.98	2.46	2.61	2.61	2.67	3.07	3.36	3.80	4.38	4.92	5.17	6.06	7.10	8.11	9.53
500	1.03	1.57	1.95	2.62	3.25	3.42	3.46	3.49	3.69	3.76	4.25	4.93	5.49	5.69	6.55	7.67	8.63	10.16
1000	1.27	1.94	2.40	3.23	4.00	4.19	4.23	4.27	4.32	4.36	4.59	5.37	5.92	6.07	6.89	8.09	8.94	10.56

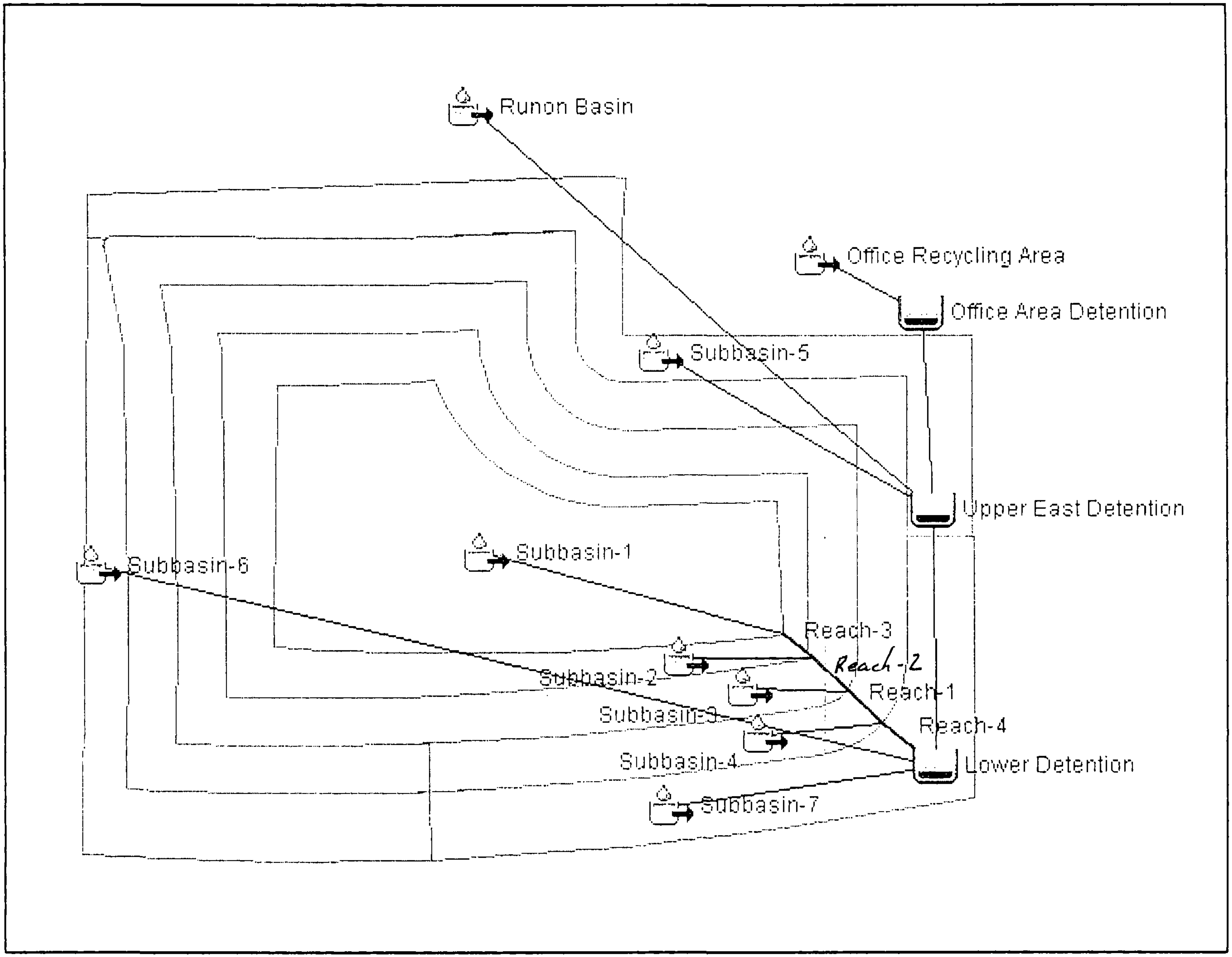
* The **upper** bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are **greater** than.
** These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval

Please refer to the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero

*** Lower bound of the 90% confidence interval**
Precipitation Frequency Estimates (inches)

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.11	0.16	0.20	0.27	0.33	0.42	0.50	0.67	0.84	1.00	1.17	1.33	1.54	1.70	2.14	2.55	3.11	3.66
2	0.14	0.21	0.26	0.34	0.42	0.53	0.62	0.82	1.03	1.24	1.44	1.64	1.90	2.09	2.64	3.14	3.83	4.50
5	0.18	0.28	0.35	0.47	0.58	0.69	0.77	0.99	1.25	1.50	1.73	1.98	2.28	2.51	3.15	3.75	4.53	5.33
10	0.23	0.35	0.43	0.58	0.72	0.83	0.91	1.15	1.43	1.71	1.97	2.25	2.59	2.85	3.54	4.19	5.07	5.94
25	0.30	0.45	0.56	0.76	0.93	1.05	1.13	1.37	1.69	1.99	2.29	2.61	3.01	3.28	4.04	4.77	5.72	6.70
50	0.35	0.54	0.67	0.90	1.11	1.24	1.31	1.55	1.89	2.20	2.53	2.90	3.31	3.59	4.38	5.16	6.17	7.22
100	0.42	0.64	0.79	1.06	1.32	1.45	1.53	1.74	2.10	2.42	2.77	3.18	3.62	3.90	4.71	5.54	6.58	7.71

WEBER COUNTY C&D LANDFILL
HMS STORM WATER MODEL



Weber County C&D Landfill
Hydrology Output from HMS
100yr 24hr Storm Event, SCS Type II Storm Distribution, NOAA 14 Rainfall Depth (2.73 inches)

Hydrologic Element	Drainage Area (Mi^2)	Peak Discharge (cfs)	Time of Peak	Volume (ac-ft)
Lower Detention	0.342	16.1	01Jan2009, 15:50	13.8
Office Area Detention	0.015	2.1	01Jan2009, 12:50	1.1
Office Recycling Area	0.015	10.9	01Jan2009, 12:10	1.1
Reach-1	0.082	15.3	01Jan2009, 13:00	4.9
Reach-2	0.052	12	01Jan2009, 12:50	3.1
Reach-3	0.031	9.5	01Jan2009, 12:40	1.8
Reach-4	0.119	19.2	01Jan2009, 13:20	7
Runon Basin	0.160	9	01Jan2009, 12:50	2.8
Subbasin-1	0.031	9.5	01Jan2009, 12:40	1.8
Subbasin-2	0.021	3.9	01Jan2009, 13:30	1.2
Subbasin-3	0.031	5.3	01Jan2009, 13:40	1.8
Subbasin-4	0.037	5.8	01Jan2009, 14:00	2.2
Subbasin-5	0.019	6.1	01Jan2009, 12:40	1.1
Subbasin-6	0.014	7.4	01Jan2009, 12:10	0.8
Subbasin-7	0.016	9.8	01Jan2009, 12:10	0.9
Upper East Detention	0.193	8.9	01Jan2009, 14:00	5

WEBER COUNTY C&D LANDFILL
HMS STORM WATER MODEL DETENTION RESULTS

Summary Results for Reservoir "Lower Detention"

Project : Trial   Simulation Run : 100yr 24hr   Reservoir: Lower Detention

Start of Run :	01Jan2000, 00:00	Basin Model :	Basin 1
End of Run :	02Jan2000, 12:00	Meteorologic Model :	100yr 24hr
Compute Time :	09Dec2008, 09:43:14	Control Specifications :	24hr

Volume Units : IN AC-FT

Computed Results

Peak Inflow :	30.1 (CFS)	Date/Time of Peak Inflow :	01Jan2000, 13:10
Peak Outflow :	16.1 (CFS)	Date/Time of Peak Outflow :	01Jan2000, 15:50
Total Inflow :	13.8 (AC-FT)	Peak Storage :	4.3 (AC-FT)
Total Outflow :	13.8 (AC-FT)	Peak Elevation :	(FT)

Summary Results for Reservoir "Office Area Detention"

Project : Trial   Simulation Run : 100yr 24hr   Reservoir: Office Area Detention

Start of Run :	01Jan2000, 00:00	Basin Model :	Basin 1
End of Run :	02Jan2000, 12:00	Meteorologic Model :	100yr 24hr
Compute Time :	09Dec2008, 09:43:14	Control Specifications :	24hr

Volume Units : IN AC-FT

Computed Results

Peak Inflow :	10.9 (CFS)	Date/Time of Peak Inflow :	01Jan2000, 12:10
Peak Outflow :	2.1 (CFS)	Date/Time of Peak Outflow :	01Jan2000, 12:50
Total Inflow :	1.1 (AC-FT)	Peak Storage :	0.4 (AC-FT)
Total Outflow :	1.1 (AC-FT)	Peak Elevation :	(FT)

Summary Results for Reservoir "Upper East Detention"

Project : Trial   Simulation Run : 100yr 24hr   Reservoir: Upper East Detention

Start of Run :	01Jan2000, 00:00	Basin Model :	Basin 1
End of Run :	02Jan2000, 12:00	Meteorologic Model :	100yr 24hr
Compute Time :	09Dec2008, 09:43:14	Control Specifications :	24hr

Volume Units : IN AC-FT

Computed Results

Peak Inflow :	16.7 (CFS)	Date/Time of Peak Inflow :	01Jan2000, 12:50
Peak Outflow :	8.9 (CFS)	Date/Time of Peak Outflow :	01Jan2000, 14:00
Total Inflow :	5.0 (AC-FT)	Peak Storage :	1.0 (AC-FT)
Total Outflow :	5.0 (AC-FT)	Peak Elevation :	(FT)

Table 2-2d Runoff curve numbers for arid and semiarid rangelands [1]

Cover description		Curve numbers for hydrologic soil group			
Cover type	Hydrologic condition [2]	A [3]	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	$\boxed{81}$ runoff basins	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	71
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	$\boxed{63}$ runon basin	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

1 Average runoff condition, and $I_a = 0.2S$. For range in humid regions, use table 2-2c.

2 Poor: <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: > 70% ground cover.

3 Curve numbers for group A have been developed only for desert shrub.

Weber County C&D Landfill
Detention Basin Calculations
Computed: GLJ, November 24, 2008

LOWER DETENTION FACILITY

Invert Elevation (ft)	0
Outlet Elevation (ft)	0
Orrifice Size (in)	21
Orrifice Coefficient:	0.6
Pipe Size (in)	24

Elevation	Area (sf)	Step Volume (cf)	Total Volume (cf)	Total Volume (acre-ft)	Orrifice Outflow (cfs)	
0.0	0	0	0	0.000	0.00	
1.0	92740.00	92740	92740	2.129	11.58	
1.08				2.400	12.20	25-yr High Water
1.94				4.300	16.10	100-yr High Water
2.0	101092.00	101092	193832	4.450	16.38	
3.0	109477.00	109477	303309	6.963	20.06	

UPPER EAST DETENTION FACILITY

Invert Elevation (ft)	0
Outlet Elevation (ft)	0
Orrifice Size (in)	15
Orrifice Coefficient:	0.6
Pipe Size (in)	24

Elevation	Area (sf)	Step Volume (cf)	Total Volume (cf)	Total Volume (acre-ft)	Orrifice Outflow (cfs)	
0.0	0	0	0	0.000	0.00	
1.0	16315.00	16315.00	16315	0.375	5.91	
1.06				0.400	6.00	25-yr High Water
2.0	18867.00	18867.00	35182	0.808	8.36	
2.39				1.000	8.90	100-yr High Water
3.0	21450.00	21450.00	56632	1.300	10.23	
3.6	23551.0	23551.00	80183	1.841	11.21	

OFFICE AREA DETENTION FACILITY

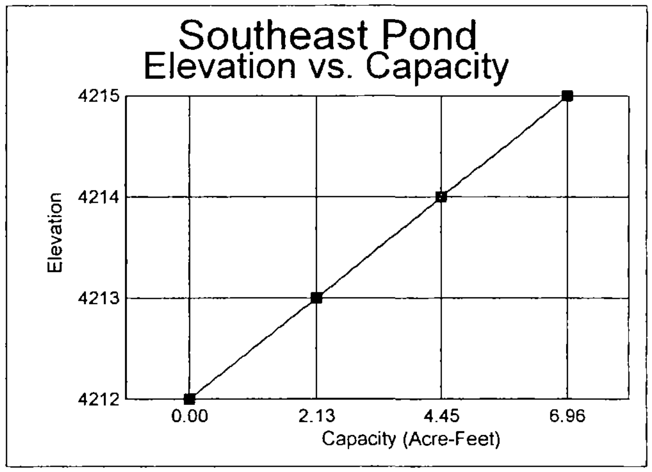
Invert Elevation (ft)	0
Outlet Elevation (ft)	0
Orrifice Size (in)	6
Orrifice Coefficient:	0.6
Pipe Size (in)	12

Elevation	Area (sf)	Step Volume (cf)	Total Volume (cf)	Total Volume (acre-ft)	Orrifice Outflow (cfs)	
0.0	0	0	0	0.000	0.00	
1.0	2781.0	2781.00	2781	0.064	0.95	
2.0	3356.0	3356.00	6137	0.141	1.34	
3.0	3962.0	3962.00	10099	0.232	1.64	
3.6				0.300	1.80	25-yr High Water
4.0	4600.0	4600.00	14699	0.337	1.89	
4.8				0.400	2.07	100-yr High Water
5.0	5270.0	5270.00	19969	0.458	2.11	
5.8	5903.0	5903.00	25872	0.594	2.28	

Client: Weber County/Moulding & Sons Landfill, LLC
Project: Landfill Permit
Feature: Stormwater Ponds, Stage vs. Capacity Relationships
Date: November 2008

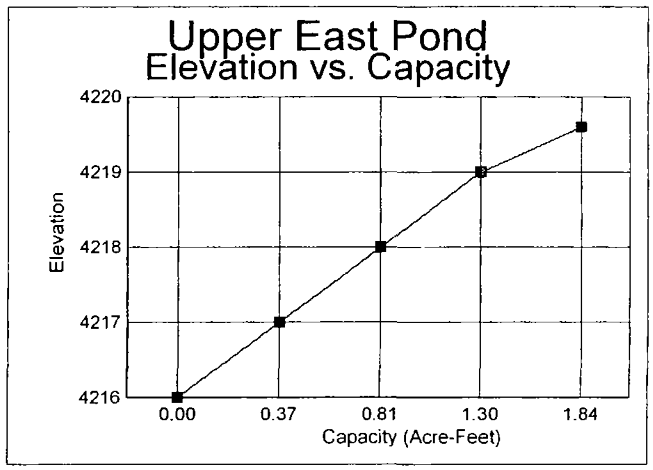
Southeast Pond

Elevation	Area (sf)	Avg. Area (sf)	Volume (cf)	Volume (ac-ft)
4212	88572		0	0.00
4213	96908	92740	92740	2.13
4214	105276	101092	193832	4.45
4215	113677	109477	303309	6.96



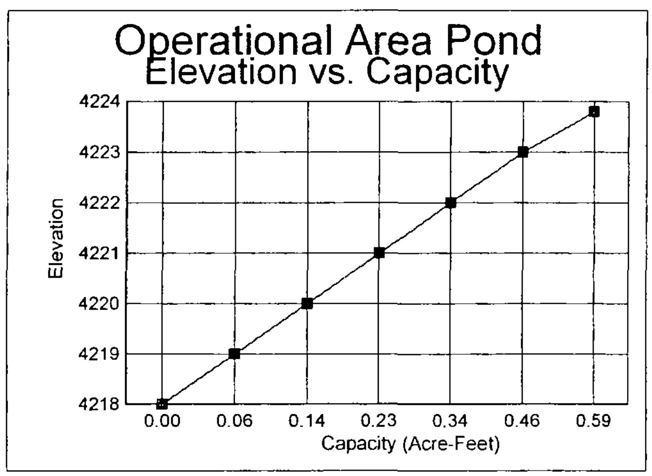
Upper East Pond

Elevation	Area (sf)	Avg. Area (sf)	Volume (cf)	Volume (ac-ft)
4216	15047		0	0.00
4217	17583	16315	16315	0.37
4218	20150	18867	35182	0.81
4219	22749	21450	56631	1.30
4219.6	24353	23551	80182	1.84



Operations Area Pond

Elevation	Area (sf)	Avg. Area (sf)	Volume (cf)	Volume (ac-ft)
4218	2502		0	0.00
4219	3060	2781	2781	0.06
4220	3651	3356	6137	0.14
4221	4273	3962	10099	0.23
4222	4927	4600	14699	0.34
4223	5613	5270	19969	0.46
4223.8	6193	5903	25872	0.59



Purpose: To determine the capacity requirements for runoff containment for exposed waste within active landfills. Waste that is inert or has received a soil cover is not considered exposed and runoff from these areas may be discharged off-site.

Method: The SCS curve number method as described in Technical Release No. 55.

Required: In order to calculate the runoff volume, the following steps and information are required:

- Delineation of the tributary area contributing to runoff.
- A weighted or representative Soil Conservation Service(SCS) curve number (CN).
- 25 year-24 hour precipitation depth.

Delineation: Runoff will be determined based on the volume generated per acre of open and active cell area of exposed waste.

Curve Numbers: The curve numbers were determined based on the hydrologic soil type located at the site and materials placed in the cells. There are assumed to be no soil vegetation cover and conditions during placement of the waste.

Precipitation: Design for the 25 year - 24 hour precipitation event is assumed for containment to provide an equivalent design to requirements for MSW facilities. The rainfall amounts were taken from the "Point Precipitation Frequency Estimates from NOAA Atlas 14". The precipitation depth value used is 2.23.

Calculations:

Rainfall runoff depth (Q) is determined by:

$Q = ((P-0.2S)^2)/(P+0.8S)$ Where: $Q =$ Runoff depth (inches)

$P =$ Precipitation depth (inches)

$S =$ Potential maximum retention after runoff begins (inches) $= (Ia)/(0.2)$

Where $Ia =$ Initial abstraction (inches)

Also S is related the SCS curve number (CN) as follows:

$S = (1000/CN)-10$

Determine SCS Curve Number (CN) for the C&D Waste Material:

C&D Waste materials will consist primarily of concrete, asphalt, wood products and other impermeable construction materials. However, the materials placed in the landfill will be broken up and will most likely consist of many voids. Much of the precipitation will either run off the surface of the waste materials or move through the void spaces between the materials. There will be some retention on the within the void spaces in the waste and on the surface of the waste pile. Soils used for cover will also most likely range between hydrologic soil type B and D.

Assume a hydrologic soil group C for soils that may be intermixed in the waste materials and assume that the impervious waste covers 50 percent of the area. Also assume the soils to be compacted similar to what a dirt road surface may represent.

Use information from Natural Resources Conservation Service, Technical Release 55 (TR-55) "Urban Hydrology for Small Watersheds."

Table 2-2a: CN = 87 for hydrologic soil group C and a dirt road type surface including right-of-way. CN = 98 for paved surfaces similar to the impermeable surfaces of waste within the landfill.

Figure 2-3: Composite CN = 93 using a pervious CN of 87 and 50% connected impervious area with a CN = 98 ((98 x 0.50)+(87 x 0.50) = 92.5).

Determine Runoff Depth Per Acre of Area

$S = (1000/93)-10 = 0.753$

$Q = ((2.23-0.2(0.753))^2)/(2.23+0.8(0.753)) = 1.54$ inches

Runoff quantity per acre is 1.54/12 = 0.13 acre foot per acre = 5,662 cf/acre

Conclusion:

Required runoff containment capacity is, therefore, 0.13 acre foot (5,662 cf) per acre of exposed waste area. This containment capacity may be provided in a number of ways including:

- A ponding area on the waste surface.
- Dikes or pond areas constructed down gradient from the working faces.
- Allowing runoff to discharge from the cell into an on-site containment pond.
- A combination of the above or any other method that will provide the required containment capacity.

Runoff water may be used inside the cell or on facility roads for dust control or used for construction water as needed for material processing and compaction.

APPENDIX 5

STORM WATER HYDRAULIC DESIGN

I. Purpose and Procedure.

The purpose of these calculations is to design the drainage channels that will convey run-on from Little Mountain and run-off from the operations area.

Federal Highway Administration HEC-15, "Design of Roadside Channels with Flexible Linings" was used as the basis for both depth and erosion protection requirements. The selected erosion protection for the channel was grass-lined, therefore chapter 4 from HEC-15 was the basis for the analysis.

II. The design dimensions for the drainage channel is a V-shaped channel with 2.5H:1V sides with a depth of 2 feet with slopes ranging from 0.5% to 1%. Design flow for the channel is 10.9 cfs, the peak 100-year 24-hour flow from the operations area. The peak flow for the channel conveying flow from run-on from Little Mountain is 9 cfs.

Step 1. Channel slope will vary between 0.5 and 1%. Channel shape will be V-shaped with 2.5H:1V sides with a peak discharge of 10.9 cfs.

Step 2. A vegetative lining on a lean clay with some sand and gravel.

Step 3. Initial depth estimate is 1.5 feet for the 1% grade:

$R = 0.70$ feet

Step 4. To estimate n, the applied shear stress on the grass lining given by Equation 2.3

$\tau_o = \gamma R S_o = 62.4(0.70)(0.01) = 0.437 \text{ lb/ft}^2$

Determine a Manning's n value from Equation 4.2. From Table 4.3, Cn = 0.2

$n = \alpha C_n \tau^{-0.4} = 0.213(0.2)(0.437)^{-0.4} = 0.059$

The discharge is calculated using Manning's equation

$Q = 1.49/0.059(5.63)(0.70)^{(2/3)}(0.01)^{(1/2)} = 11.2 \text{ ft}^3\text{/s}$

Step 5. This value is within 5% of the design flow of 10.9 cfs, so we can proceed to step 6.

Step 6. The maximum shear on the channel bottom is:

$\tau = \gamma d S_o = 62.4(1.5)(0.01) = 0.936 \text{ lb/ft}^2$

Determine the permissible soil shear stress from Equation 4.6.

$T_{p,soil} = (c_1PI^2+c_2PI+c_3)(c_4+c_5e)^2c_6=(1.07(17)^2+14.3(17)+47.7)(1.48-0.57(0.5))^2 10^{-4}$

$= 0.086\ lb/ft^2$

Equation 4.7 gives the permissible shear stress on vegetation. The value of C_f is found in Table 4.5.

$T_p = T_{p,soil}/(1-C_f)(n/n_s)^2 = (0.086/(1-0.5))(0.059/0.016)^2 = 2.34\ lb/ft^2$

The safety factor for this channel is taken as 1.0.

Step 7: The grass lining is acceptable since the maximum shear on the vegetation is less than the permissible shear of 2.7 lb/ft^2. The grass lining will therefore also be sufficient for the 0.5% grade parts of the channel.

APPENDIX 6

EROSION PROTECTION

I. Purpose and Procedure.

The purpose of these calculations is to determine which erosion protection measure to use and how to apply it. The closure cap will consist of a 2.5H:1V slope extending up from the toe of the cap at ground surface. Benches will be constructed in the slopes of the closure cap to intercept precipitation and snow melt runoff from the slopes as needed to control runoff and to minimize erosion, with a slope of 6H:1V creating the bench with the closure cap slope of 2.5H:1V.

The procedure used to determine the allowable slope lengths between the bench areas of the closure cap slopes is taken from the publication "Erosion and Sedimentation in Utah - A Guide for Control", Utah Water Research Laboratory, February 1984. This publication is specific to Utah. The figure presented on Sheet 2 presents a cross-section showing the configuration of the area contributing runoff to the slopes of the closure cap. The degree of erosion protection required is based on the steepness and length of the slopes. Erosion protection measures will be determined for the longest slope length and the erosion control measures determined for the longest slope will be conservatively applied to all slopes.

II. The procedure from the above publication uses the Universal Soil Loss Equation (in modified form to represent Utah's climatic and topographic conditions) to estimate the soil erosion potential of the surface soils assuming no application of erosion control measures. Erosion control measures to be implemented are based on the soil erosion potential calculated.

The universal soil loss equation used to calculate soil erosion potential is:

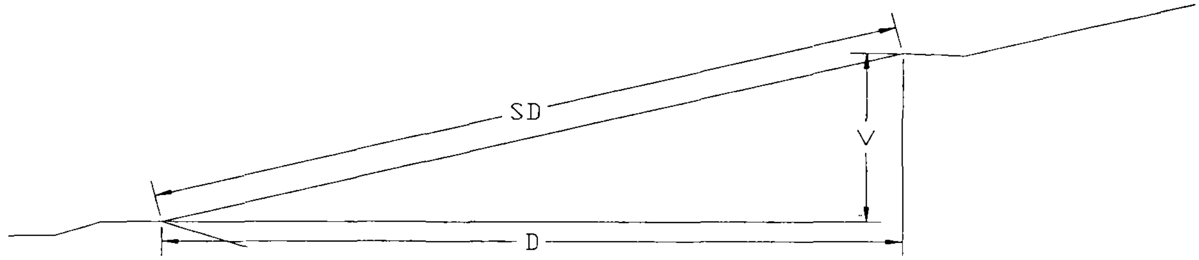
$$A = R \cdot K \cdot LS$$

where; A = Computed amount of soil loss per unit area for the time interval represented by factor R, generally in tons per acre per year.

R = Rainfall (precipitation) factor.

K = Soil erodibility factor in tons per acre per year per unit of R.

LS = Topographic factor (length and steepness of slope).



D = Horizontal Distance
V = Vertical Distance
SD = Slope Distance

For 2.5H:1V Slopes

$$D = 2.5V$$

$$SD = \sqrt{D^2 + V^2}$$

$$SD = \sqrt{\left(2.5^2\right)\left(V^2\right) + V^2}$$

$$SD = \sqrt{7.25V^2}$$

Calculated erosion after applying erosion control measures is determined by applying and erosion control factor (VM) to the universal soil loss equation. The erosion control factor is dependant upon the type and extent to which the erosion control measure is used (ie. vegetative - type and density, mulches - type and thickness, chemical - type and application amount, mechanical - compactive effort, smoothness of surface, etc.).

A. The rainfall (precipitation) factor (R) is obtained from mean annual iso-erodent (R) value maps. The R-value for the facility as obtained from the Tooele area map is:

$$R = 4.0$$

Since R = 4.0 is based on an annual recurrence interval, a correction factor is obtained from the figure below for the 100-yr recurrence interval
For the 100-yr recurrence interval:

$$R = 4.0*(2.51) = 10.04$$

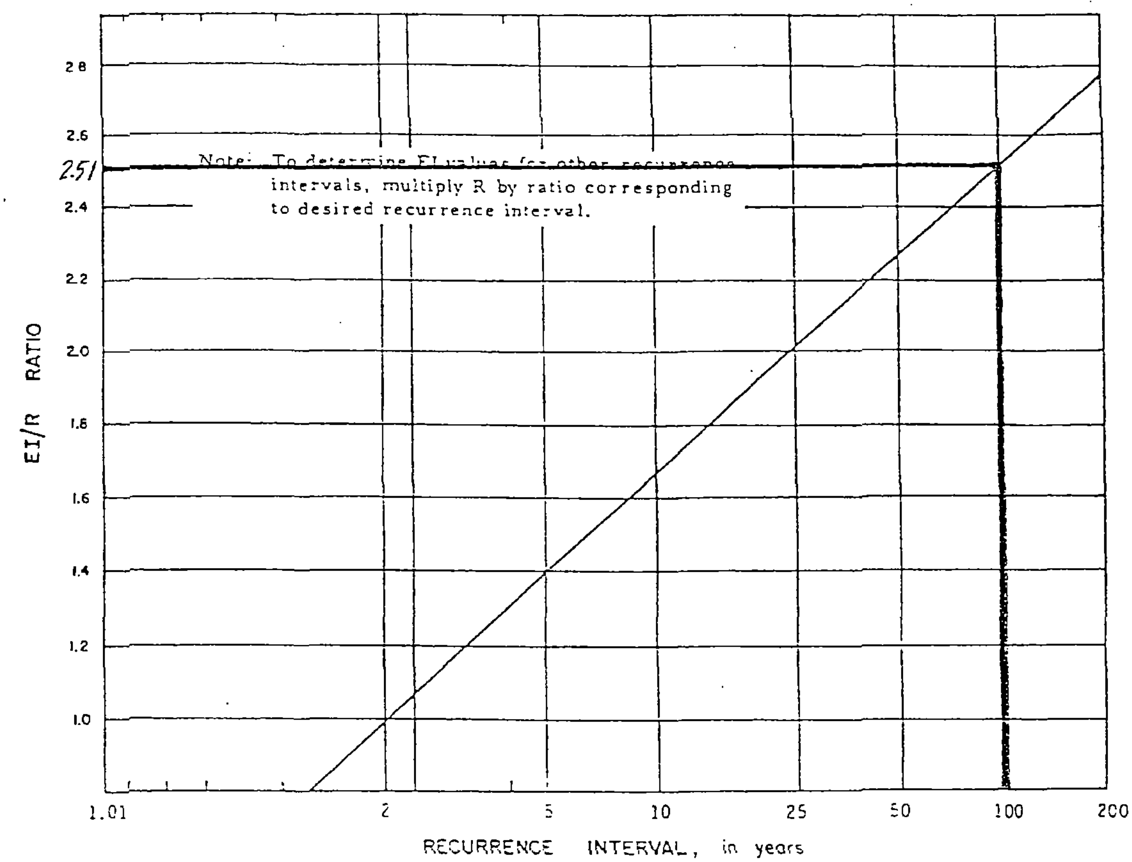


Figure 2-1. The relationship between the EI/R ratio and recurrence interval.

B. Soil erodibility factor (K) is determined using figure 2 from the above referenced report. The gradation of the materials is based on information from the AGEC soil report.

The worst case condition is represented by the soils whose gradation is on the fine side of the soil gradation envelope. Parameters obtained from the gradation envelope and parameters assumed for use with the nomographs to determine K are:

85 % silt and very fine sand, and
15% sand were obtained from the gradation envelope.

1 % organic material and a very slow permeability were assumed parameters.

Applying the above parameters to the nomographs from Figure 2 gives a soil erodibility factor (K) equal to 0.66.

C. The topographic factor (LS) is determined assuming single slopes. The figure on Sheet 2 shows the configuration of typical slope segments that need to be accounted for in the calculations which includes a 2.5H:1V for the closure cap slope. The LS factor is determined by the following equation:

$$LS = \left(\frac{65.41\ s^2}{s^2 + 10{,}000} + \frac{4.56\ s}{\sqrt{s^2 + 10{,}000}} + 0.065 \right) \left(\frac{l}{72.6} \right)^m$$

where;
- LS = topographic factor for slope segment n.
- l = length of slope segment n.
- s = slope gradient of segment n in percent.
- l = slope length
- m = slope gradient factor, which is
  - 0.2 for gradients of 0 to 2 percent
  - 0.3 for gradients of 1 to 3 percent
  - 0.4 for gradients of 3.5 to 4.5 percent
  - 0.5 for gradients greater than 5 percent

The following table provides LS factor values for varying lengths of the 2.5H:1V slope.

HORIZONTAL DISTANCE ALONG SLOPE (ft)	SLOPE LENGTHS (ft) AND LS FACTOR VALUES	
	2.5H:1V (40%) Slope	
	Slope Length	LS Factor
15	40.39	5.9055
65	175.02	12.2933
115	309.65	16.3516
165	444.28	19.5863

D. Potential Erosion Rates without erosion protection where R = 10.04, K = 0.66 and LS as tabulated above are presented in the table below:

POTENTIAL EROSION RATES (A) ASSUMING BARE SOILS

HORIZONTAL DISTANCE ALONG SLOPE (ft)	2.5H:1V (40%) Slope		
	Slope Length	LS	A (tons/ac/yr)
15	40.39	5.9055	39.13
65	175.02	12.2933	81.46
115	309.65	16.3516	108.35
165	444.28	19.5863	129.79

E. Potential Erosion Rates for varying VM factors where R = 10.04, K = 0.66 and LS as tabulated above are presented in the table below:

POTENTIAL EROSION RATES FOR VARYING VM FACTORS

HORIZONTAL DISTANCE ALONG SLOPE (ft)	A(tons/ac/yr) 2.5H:1V (40%) Slope					
	VM =					
	0.008	**0.009**	**0.01**	**0.011**	**0.012**	**0.013**
15	0.31	0.35	0.39	0.43	0.47	0.51
65	0.65	0.73	0.81	0.90	0.98	1.06
115	0.87	0.98	1.08	1.19	1.30	1.41
165	1.04	1.17	1.30	1.43	1.56	1.69

F. Required Stone Mulch

The amount of stone mulch required to limit soil loss to one ton per acre per year is determined from figure 6 of the above referenced report as shown on the following page. This figure shows the amount of stone mulch required to reduce the erosion potential from as much as 130 tons per acre per year to one ton per acre per year.

For the 2.5H:1V (40%) Slope:

Approximately 500 tons per acre of stone mulch is required. The required thickness of stone mulch is:

t = (Required tons/acre of stone mulch x 2000 lbs/ton x 12 in/ft)/ (43560 ft^2/acre x stone mulch density lbs/ft^3)

Assuming a stone mulch density of 110 lbs/ft^3

t = 500(2000)(12)/(43560)(110) = 2.5 in.

Recommending 3 in. cover for all slopes.

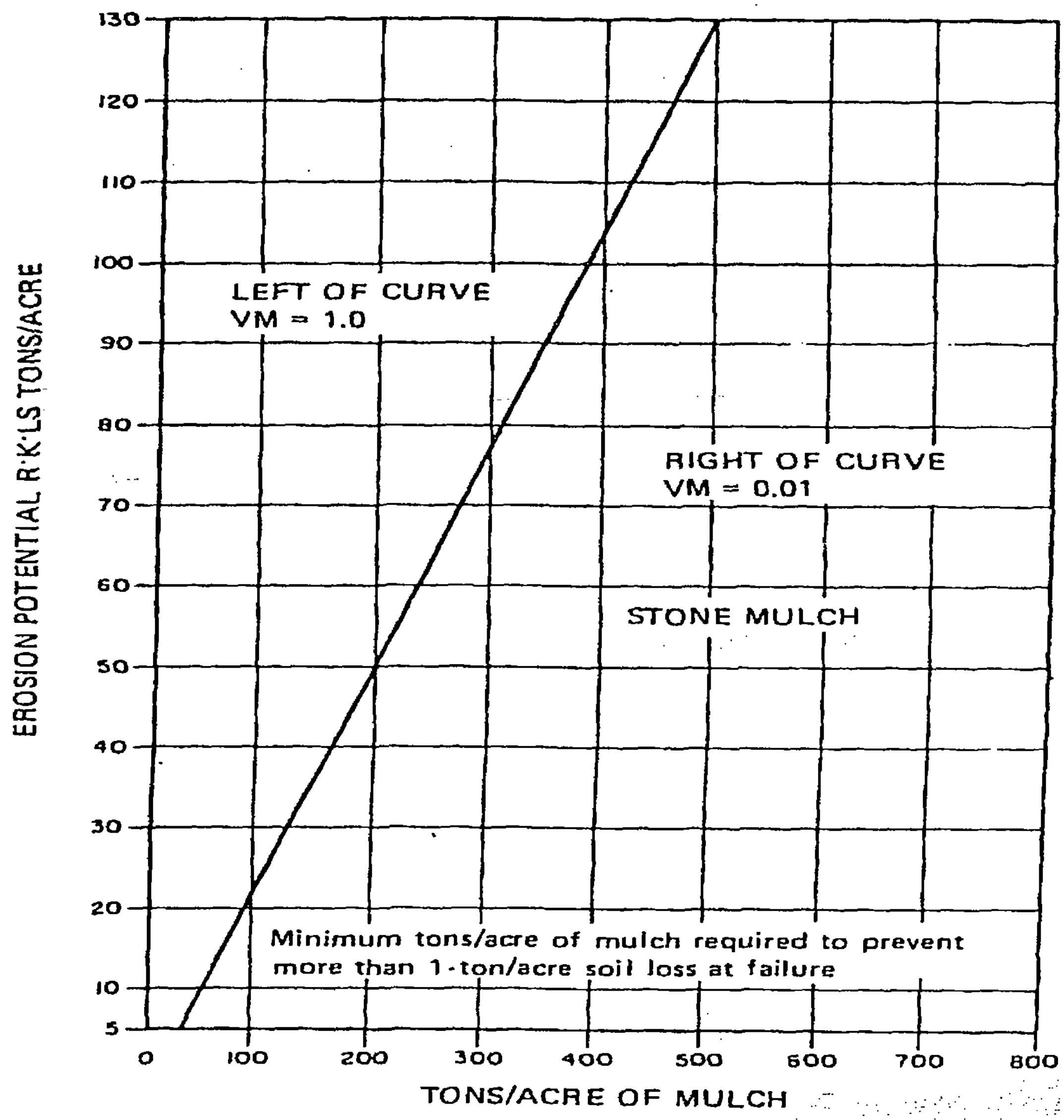


Figure 6. Stone mulch vs. R·K·LS.

G. Required Vegetative Cover

If a vegetative cover of grass is used instead of the stone mulch, the amount of cover required is determined from the figure 7 of the above referenced report as shown on the following page. The VM factor required is calculated by the following equation:

$$VM = 1/A$$

For the 2.5H:1V (40%) Slope:

VM = 1/130 = 0.008

Percent Ground Cover of Grass = 97% (Regardless of tall weeds)

Vegetation has successfully been used for erosion control on slopes across Utah on the down stream faces of dams, on highway cuts and fills, and on landfill slopes. Recommend testing the effectiveness of vegetation on the slopes below the lowest storm drainage bench to establish types of vegetation and extent of vegetation that should be used for final closure. Results may show the vegetation is effective by itself, it may require placement of erosion control mats, or may require placement of stone mulch at the lower portions of slopes.

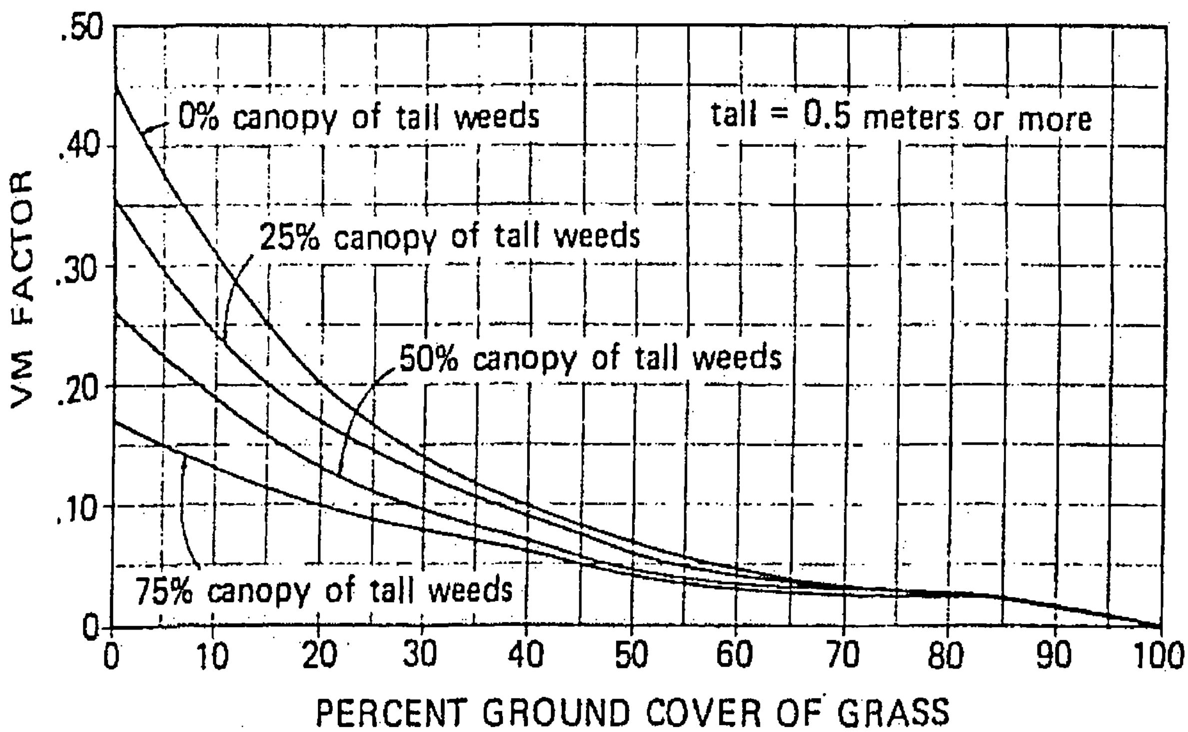


Figure 7. Relationship between grass density and VM factor.

EXHIBIT B

Quit Claim Deed

C2008-227
Real Estate
Purchase Agreement

C2008-228
Landfill Operating and
Management Agreement

W2370293

When recorded, return to:
Moulding Investments, L.L.C.
910 West 21st Street
Ogden, Utah 84401

E# 2370293 PG 1 OF 4
ERNEST D ROWLEY, WEBER COUNTY RECORDER
16-OCT-08 1039 AM FEE $18.00 DEP SPY
REC FOR: MOULDING INVESTMENTS

QUITCLAIM DEED

MOULDING INVESTMENTS, LLC a Utah Limited Liability Company, and **COUNTERPOINT CONSTRUCTION COMPANY, INC**, Grantors, hereby quitclaims to **MOULDING INVESTMENTS, LLC** a Utah Limited Liability Company, whose address is 910 West 21st Street, Ogden, Utah 84401, for the sum of Ten Dollars ($10.00) and other good and valuable consideration, the following described tract of land in Weber County, State of Utah:

See Exhibit A attached hereto and incorporated herein by this reference.

Dated this 16 day of OCT, 2008.

MOULDING INVESTMENTS, LLC, a Utah Limited Liability Company

By: ________________

COUNTERPOINT CONSTRUCTION COMPANY, INC.

By: ________________

State of Utah

County of Weber

On the 16 day of OCTOBER, 2008, personally appeared before me **Randy Moulding,** who is duly sworn, did say, that he, **Randy Moulding**, is President of **Moulding Investments, LLC,** a Utah Limited Liability Company, and **Kelly Penrod,** who is duly sworn, did say, that he, **Kelly Penrod**, is Vice President of **CounterPoint Construction Company, Inc.,** and that the within and forgoing instrument was signed in behalf of said Limited Partnership, and Incorporated Company, by authority of its resolution of its LLC and INC.

Lynda D. Folkman
Notary Public

My Commission Expires:

12-7-2009

LYNDA D. FOLKMAN
NOTARY PUBLIC • STATE of UTAH
36 West 4300 South
Ogden, Utah 84405
COMM. EXP. 12-07-2009

EXHIBIT A

ALL THAT PROPERTY IN THE NORTH HALF OF SECTION 19, TOWNSHIP 6 NORTH, RANGE 3 WEST, SALT LAKE BASE & MERIDIAN, IN THE STATE OF UTAH, COUNTY OF WEBER, MORE PARTICULARY DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON THE NORTH SIDE OF A 100 FOOT PERPETUAL EASEMENT, SAID POINT BEING SOUTH 425.19 FEET AND WEST 4.17 FEET FROM THE NORTHWEST CORNER OF SAID SECTION, BASIS OF BEARING MAY BE DETERMINED LOCALLY BY A BEARING OF S89°23'44"E, BETWEEN THE NORTHWEST CORNER AND THE NORTHEAST CORNERS OF SAID SECTION; THENCE ALONG THE NORTH LINE OF SAID EASEMENT THE FOLLOWING FIVE COURSES, S89°05'20"E 12.18, AND N87°50'35"E 1450.90 FEET TO THE BEGINNING OF A CURVE CONCAVE TO THE SOUTH, WITH A RADIUS OF 868.51 FEET, THENCE EASTERLY 198.57 FEET, THROUGH A CENTRAL ANGLE OF 13°06'00", AND S79°05'14"E 485.59 FEET, TO THE BEGINNING OF A CURVE CONCAVE TO THE NORTH, WITH A RADIUS OF 768.51 FEET, THENCE EASTERLY 474.18 FEET, THROUGH A CENTRAL ANGLE OF 35°21'09"; THENCE LEAVING SAID NORTH LINE, SOUTH 1811.66 FEET, TO THE NORTHERLY RIGHT-OF-WAY OF THE SOUTHERN PACIFIC RAILROAD COMPANY; THENCE ALONG SAID RIGHT-OF-WAY THE FOLLOWING FOUR COURSES; S81°46'35"W 221.51 FEET, AND S81°42'06"W 251.02 FEET, TO THE BEGINNING OF A CURVE CONCAVE TO THE NORTH, WITH A RADIUS OF 10491.76 FEET, THENCE WESTERLY 2155.58 FEET, THROUGH A CENTRAL ANGLE OF 11°46'18", AND N89°26'02"W 1.88 FEET TO THE EASTERLY BOUNDARY OF THE USAF PROPERTY; THENCE LEAVING SAID RIGHT-OF-WAY AND ALONG SAID EASTERLY BOUNDARY THE FOLLOWING TWO COURSES, N00°33'58"E 1867.42 FEET, AND N00°35'08"E 100.78 FEET TO THE POINT OF BEGINNING.

CONTAINING 116.69 ACRES MORE OF LESS.

TOGETHER WITH A PERPETUAL EASEMENT FOR ACCESS AND CONSTRUCTION OF UTILITIES, MORE PARTICULARY DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON THE NORTH SIDE OF A 100 FOOT PERPETUAL EASEMENT, SAID POINT BEING SOUTH 423.16 FEET AND EAST 2595.73 FEET FROM THE NORTHWEST CORNER OF SAID SECTION 19, BASIS OF BEARING MAY BE DETERMINED LOCALLY BY A BEARING OF S89°23'44"E, BETWEEN THE NORTHWEST CORNER AND THE NORTHEAST CORNERS OF SAID SECTION 19; THENCE ALONG THE NORTH LINE OF SAID EASEMENT THE FOLLOWING NINE COURSES; EASTERLY ALONG A CURVE, CONCAVE TO THE NORHTWEST, WITH A RADIUS OF 768.51 FEET, THENCE ALONG SAID CURVE 214.24 FEET, THROUGH A CENTRAL ANGLE OF 15°58'21", AND N49°3705"E 309.04 FEET, AND N65°33'35"E 139.61 FEET; AND S00°00'25"E 32.86 TO THE SOUTH SIDE OF A

COUNTY ROAD, AND ALONG SAID SOUTH SIDE, S89°47'56"E 331.04 FEET; AND S00°14'05"W 7.51, SAID POINT ALSO BEING THE BEGINNING OF A CURVE, CONCAVE TO THE SOUTHEAST, WITH A RADIUS OF 768.51 FEET, THENCE WEST AND SOUTHWESTERLY 544.84 FEET, THROUGH A CENTRAL ANGLE OF 40°37'13", AND S49°37'05"W 169.04 FEET, TO THE BEGINNING OF A CURVE CONCAVE TO THE NORHTWEST, WITH A RADIUS OF 868.51 FEET, THENCE WESTERLY 286.61 FEET, THROUGH A CENTRAL ANGLE OF 18°54'28; THENCE NORTH 108.43 FEET TO THE POINT OF BEGINNING.

ALSO TOGETHER WITH ½ OF ANY AND ALL WATER, WATER RIGHTS, WATER SHARESSURFACE AND SUB-SURFACE, APPURTENANT TO , OR USED IN CONJUNCTION WITH, THE ABOVE STATED PARCEL
SUBJECT TO EASEMENTS, RESTRICTIONS AND RIGHTS OF WAY APPEARING OF RECORD AND ENFORCEABLE IN LAW.

THE PURPOSE AND INTENT OF THIS QUIT CLAIM DEED, IS TO SEPARATE THE ½ INTERESTS OF THE PROPERTY AS LISTED AS PARCEL #100400001 OF OFFICAL RECORD WITH THE WEBER COUNTY RECORDERS OFFICE AND DESCRIBED IN DOCUMENT ENTRY #2305658 DATED NOVEMBER 20, 2007.

ALSO SUBJECT TO ANY AND ALL EASEMENTS, AND EXCEPTIONS AS PERTAINING TO SUBJECT PARCEL AS DESCRIBED IN DOCUMENT ENTRY #2305658 DATED NOVEMBER 20, 2007, RECORDED WITH THE WEBER COUNTY RECORDERS OFFICE.

12-23

C2008-227

REAL ESTATE PURCHASE AGREEMENT

THIS REAL ESTATE PURCHASE AGREEMENT (hereinafter "Agreement") is made and entered into on the 23 day of ~~November~~ December 2008, by and between Weber County, a body politic, corporate and political subdivision of the State of Utah (hereinafter "Buyer") and Moulding Investments, LLC, a Utah limited liability company (hereinafter "Seller").

RECITALS

WHEREAS, according to the official records of the Recorder of Weber County, State of Utah, Seller owns real property (hereinafter the "Land") more fully described in Exhibit "A" which is attached hereto and hereby incorporated into this Agreement; and

WHEREAS, Buyer is in need of purchasing the Land to facilitate the development of a construction and demolition landfill (the "Landfill"); and

WHEREAS, Buyer and Moulding and Sons Landfill, LLC, a Utah limited liability company, have entered into a Landfill Operation and Management Agreement of even date herewith (the "Management Agreement"), pursuant to which said Moulding and Sons Landfill, LLC, will, upon issuance of all permits, licenses and approvals by applicable governmental entities (collectively, the "Permits"), manage and operate the Landfill; and

WHEREAS, Seller is willing to accept as compensation for the Property (as defined below) the consideration more fully enumerated below; and

WHEREAS, Seller and Buyer have determined that this Agreement is mutually beneficial to each Party;

NOW, THEREFORE, in consideration of the covenants contained herein, the Buyer and Seller hereby agree as follows:

SECTION ONE
PROPERTY

Seller agrees to convey to Buyer all of Seller's interest in the Land described above together with all of Seller's rights, title and interest in a mobile building to be relocated from Seller's present business premises to the Land (the "Building") and all appurtenances specifically attached to the Land including, but not limited to, Seller's interest in any assignable licenses, permits, appurtenant mineral rights, appurtenant water rights (including shares in irrigation companies which serve the Land), easement, rights-of-way or other items that may benefit the same, if any. (All items referenced in this paragraph are hereinafter collectively referred to as the "Property").

SECTION TWO
CONSIDERATION

The consideration for the conveyance shall be as follows:

A. Purchase Price. The Purchase Price shall be SEVEN HUNDRED FIFTY THOUSAND DOLLARS ($750,000), and shall be paid as follows:

A. Earnest Money. Buyer shall deposit TEN THOUSAND DOLLARS ($10,000) with Home Abstract Title Company ("Title Company") upon execution of this Agreement, as earnest money ("Earnest Money"). The Earnest Money shall be credited toward the Purchase Price at Closing.

B. Additional Money at Closing. In addition to the Earnest Money which shall be released to the Seller at Closing, Buyer shall pay the balance of SEVEN HUNDRED FORTY THOUSAND DOLLARS ($740,000) at Closing.

SECTION THREE
ESCROW

Upon Buyer's receipt of a fully executed copy of this Agreement, Buyer shall open an escrow with Title Company, by depositing with Title Company the Earnest Money and an executed copy of this Agreement. The Agreement, together with other written instructions as will be provided by Buyer and Seller to Title Company, shall constitute its escrow instructions to the Title Company.

SECTION FOUR
EFFECTIVE DATE

The Effective Date shall be deemed the date of execution of this Agreement by both parties.

SECTION FIVE
TITLE COMMITMENT

Within Ten (10) days of the Effective Date, Buyer may at Buyer's sole discretion and cost choose to purchase Title Insurance and obtain a commitment therefor (the "Commitment").

SECTION SIX
SURVEY AND BUILDING PLANS

Within ten (10) business days after the Effective Date, Seller shall deliver to Buyer a copy of any survey of the Property which Seller has in its possession. If Seller has no survey of the Property none shall be required. If Buyer elects to obtain a new Survey of the Property, it shall pursue completion of the same with diligence at its own expense.

SECTION SEVEN
TITLE AND SURVEY OBJECTIONS

Within Ten (10) business days after Buyer's receipt of the Title Commitment and Survey, Buyer shall give written notice to Seller of any matters contained in the Title Commitment or Survey to which Buyer objects ("Objections"). Any matters in the Title Commitment or Survey to which Buyer does not so object shall be "Permitted Exceptions."

SECTION EIGHT
CURE OF OBJECTIONS

Seller shall have Ten (10) business days after receipt of the notice contemplated by Section 7 above relative to the Title Commitment and Survey, or update ("Sellers Cure Period"), to cure the Objections to the satisfaction of Buyer or elect not to cure the same; provided, however, all consensual monetary encumbrances recorded against the Property will be discharged or otherwise removed by Seller on or before Closing. If Seller gives notice that Seller will not cure the Objections to Buyers satisfaction within Sellers Cure Period, then Buyer may (a) waive any such Objections and proceed to Closing, or (b) terminate this Agreement and receive back the Earnest Money.

SECTION NINE
INVESTIGATIONS

From the Effective Date through the duration of the Due Diligence Period as defined below, Buyer and its representatives shall have the right to enter upon the Property to conduct at its own expense investigations, including without limitation, obtaining or performing surveys, soils and/or water tests, engineering studies, feasibility studies, environmental assessments and inspections, evaluating the availability of utilities, drainage, and access, and performing such other investigations as Buyer may desire to determine the suitability of the Property for Buyers intended use. Buyer shall provide to Seller, without cost, copies of any and all results of Buyers investigations or studies if Buyer elects not to purchase the Property; provided, however, that the copies are delivered without any warranty whatsoever as to the accuracy thereof. Buyer, in the conduct of its investigation, shall not unreasonably interfere with any existing operations on the Property and Buyer shall indemnify and hold Seller harmless from and against any and all physical damage to the Property resulting from Buyer's investigation of the Property and any costs, liability or other adverse consequences (e.g. mechanic's liens) associated with or arising out of such investigations.

SECTION TEN
DUE DILIGENCE PERIOD

Seller agrees that Buyer shall have a period of Thirty (30) calendar days ("Due Diligence Period") after the Effective Date to determine the suitability of the Property for Buyer's intended use. It is understood that suitability will be dependent upon, among other things, the following:

A. Zoning. The zoning of the Property must be satisfactory to the Buyer in that the zoning allows Buyer to utilize the property for its intended purpose and shall receive that approval from all governing entities with jurisdiction over the Property.

B. Streets. The Property shall have vehicular access into and out of the Property by means satisfactory to Buyer.

C. Studies. All studies (other than the Survey and Condition of Title, which shall be as previously approved) including, without limitation, environmental and geotechnical studies, at Buyer's sole discretion, shall show the Property to be acceptable for Buyer's intended use.

Buyer may end the Due Diligence Period at any time by giving notice to Seller and proceed with the purchase under the terms set forth herein. Buyer shall give Seller notice of its decision to proceed with this purchase (subject to conditions herein stipulated) or to terminate on or before the expiration of the Due Diligence Period. Should Buyer provide notice to terminate, or fail to provide notice prior to the expiration of the Due Diligence Period, this Agreement shall terminate and be of no further force or effect, and Buyer shall receive all of the Earnest Money deposited with the Title Company.

SECTION ELEVEN
CONDEMNATION

If, prior to the Closing, Seller receives notice that a condemnation or eminent domain action is threatened or has been filed against the Property or any part thereof (or that a taking is pending or contemplated), Seller shall promptly give notice thereof to Buyer. If such taking is of a portion of the Property such that the value or usefulness of the Property is, in Buyer's sole option, materially impaired or reduced, Buyer may elect, by written notice delivered to Seller within fifteen (15) days after receipt of Buyer's notice, to terminate this Agreement and the Escrow, in which event neither party shall have any further obligation hereunder and all monies deposited hereunder shall be returned to the party depositing same. If Buyer does not deliver written notice of termination within said fifteen (15) day period, then: (a) neither party shall have a right to terminate this Agreement; (b) Seller shall assign and deliver to Buyer all of Seller's interest in the award (or right to such award) for such taking of the Property; and (c) the parties shall continue performance under this Agreement and the Escrow, without modification of any of its terms and without any reduction in the Purchase Price.

SECTION TWELVE
CLOSING

The conveyance of the Property to Buyer shall be closed on the Closing Date at the office of the Title Company, which date shall be within Ten (10) days after the issuance of the Permits.

SECTION THIRTEEN
CLOSING DOCUMENTS

The following documents shall be delivered at Closing:

A. Deed. Seller shall deliver a General Warranty Deed conveying to Buyer, all Seller's interest in the Property free and clear of all restrictions, liens, assessments, tenancies, whether recorded or unrecorded, or other encumbrances except as otherwise provided in this Agreement.

B. Other. The Buyer shall deliver, in addition to the Purchase Price to Seller, any other documentation reasonably required by the Title Company to appropriately conduct the Closing on the Property.

SECTION FOURTEEN
CLOSING COSTS

Closing costs and prorations shall be prorated as follows:

A. Fees. Any escrow fee charged by Title Company shall be shared equally by Seller and Buyer. Each party will pay its own attorney's fees. Buyer shall pay the cost of recording the Deed.

B. Other. Except as otherwise provided herein, all other bills or charges including other recording fees, any state or local documentary stamps, transfer taxes or fees, assessments for improvements completed or initiated prior to the Closing, whether levied or not, pertaining to the Property as of the date of Closing shall be allocated according to local custom of the Title Company.

SECTION FIFTEEN
POSSESSION

Possession of the Property shall be delivered to Buyer at Closing. Seller agrees that any improvements remaining on the Property after such date shall belong to Buyer.

SECTION SIXTEEN
WARRANTIES

I. Seller's Warranties. Seller makes the following representations, warranties and covenants as of the date of this Agreement and as of the date of Closing, and such warranties and covenants shall survive the Closing. The warranties provided in this Section 16 and its subparagraphs shall be enforceable by the Buyer and its successors and assigns.

A. Title. Seller owns good and marketable fee simple absolute title to the Property, subject to all matters of record, and is fully authorized to convey the Property pursuant to this Agreement.

B. No Proceedings. As of the date of this Agreement there are no pending and, to the best of Sellers knowledge, threatened condemnation or similar proceedings or assessments affecting the Property, lawsuits by adjoining landowners or others, nor to the best knowledge and belief of Seller is any such lawsuit contemplated by any person, nor, to Seller's best knowledge, is any condemnation or assessment contemplated by any governmental authority other than as disclosed in writing by Seller.

C. No Leases. Except as otherwise expressly provided herein, at the time of Closing, the Property will not in whole or in part be subject to any leases, or other possessory rights and interests, except as may have been reflected in the Title Commitment.

D. No Contracts. Seller has not and will not enter into any written contracts, agreements, or listings, or be a party to any oral understandings or agreements affecting the Property which may become binding upon Buyer, except as may be reflected by recorded documents.

E. Compliance with Laws. To the best knowledge of Seller, Seller has complied with all applicable laws, ordinances, regulations, statutes and rules relating to the Property.

F. Environmental.

(1) Definitions of Environmental Law, Hazardous Substances, Environmental Conditions and Environmental Claims:

a. Environmental Law. For purposes of this Agreement the term "Environmental Law" shall mean any federal, state, regional, municipal or local statute, code, ordinance, rule, regulation, policy, guideline, permit, consent, approval, license, judgment, order, writ, decree, injunction or other authorization relating to:

(i) emissions, discharges, releases or threatened releases of Hazardous Substances (as defined below) in the natural or human environment, including, without limitation, air, soil, sediments, land surface or subsurface, surface water, ground water, buildings or facilities, treatment works, drainage systems or septic systems; or

(ii) the generation, treatment, storage, disposal. use, handling, manufacturing, transportation, or shipment of Hazardous Substances; or otherwise concerning pollution or protection of the environment, public health and safety, employee health or safety, or solid waste handling, treatment or disposal.

Except as otherwise provided herein, any reference in this Agreement to any Environmental Law or other statute includes and is a reference to such Environmental Law or statute and to the regulations made pursuant thereto with all amendments made thereto and in force from time to time, and to any Environmental Law or statute or regulations that may be passed which have the effect of supplementing or superseding such Environmental Law or statute or regulations.

b. Hazardous Substances. For purposes of this Agreement the term pollutants, contaminants, dangerous substances, constituents, toxic substances, hazardous or toxic chemicals, hazardous wastes and hazardous substances as those terms are defined in the following statutes and their implementing regulations: the Hazardous Materials Transportation Act, 49 U.S.C. § 1801 et seq., the Resource Conservation and Recovery Act, 42 U.S.C. §6901 et seq., the Comprehensive Environmental Response, Compensation and Liability Act, as amended by the Superfund Amendments and Reauthorization Act, 42 U.S.C. § 9601 et seq., ("CERCLA"), the Clean Water Act, 33 U.S.C. § 33 U.S.C. § 1251 et seq., the Toxic Substances Control Act, 15 U.S.C. § 2601 et seq., the Clean Air Act, 42 U.S.C. § 7401 et seq., and any other federal, state or local statute or regulations dealing with similar matters, (ii) petroleum, including crude oil and fractions thereof, (iii) natural gas, synthetic gas and any mixtures thereof, (iv) asbestos and/or asbestos containing materials, (v) PCB's or PCB-containing materials or fluids, (vi) any other substance, including sewage sludge, with respect to which any federal, state or local agency or other governmental entity may require either an environmental investigation or any environmental remediation, and (vii) any other hazardous or noxious substance, material, pollutant, or solid waste that is regulated by, or forms the basis of liability under any Environmental Law.

c. Environmental Condition. For purposes of this Agreement, the term "Environmental Condition" shall mean any condition with respect to the environment (including soil, surface waters, ground waters, land, stream sediments, surface or subsurface strata, ambient air, and any environmental medium) and any condition with respect to the interior or exterior of buildings or structures (including without limitation friable and non-friable asbestos, lead based paint or any Hazardous Substance located in the interior or on the exterior of buildings or structures) whether or not the condition is known, which could or does result in any liability, claim, cost, or order to or against the Buyer or Seller by any third party (including, without limitation, any government entity).

d. Environmental Claims. For purposes of this Agreement, the term "Environmental Claims" shall mean any and all liabilities, demands, claims or actions, clean-up costs, remediation, removal or other response costs, legal expenses (including attorneys' fees), investigation costs (including fees of consultants, counsel and other experts in connection with environmental investigation or testing), any other losses, liabilities, obligations, fines, penalties (civil or criminal), damages (including compensatory, punitive, natural resource damages), or payments sought or claimed by any person, governmental agency or other entity which are based upon the violation or alleged violation of any Environmental Law (as defined above) or the imposition or liability by the operation of any Environmental Law.

(2) Seller's Environmental Warranties and Covenants.

a. To the best of Seller's knowledge, Seller warrants that during the period that Seller has owned the Property, there has been no storage, production, transportation, disposal, treatment or release of any Hazardous Substances on or in the Property (other than the potential for the existence asbestos which has been disclosed to the Buyer). Seller further warrants that to the best of Seller's knowledge, during Seller's ownership of the Property, Seller has complied with all Environmental Laws relating to the Property and that there are no wells, underground storage tanks, covered surface impoundments or other sources of Hazardous Substances on the Property.

b. To the best of Seller's knowledge, there are no wetlands on the Property nor has there been any earth settlement, movement instability or other damage from natural causes which may have affected the Property.

c. Buyer hereby assumes all obligations related to, and shall indemnify, defend, release and hold harmless Seller, its successor and assigns, from and against all Environmental Claims relating to, arising from or attributable to, directly or indirectly, in whole or in part relating to the existence, removal and/or remediation of Hazardous Substances and Environmental Conditions existing on the Property as of the date of Closing.

II. Buyer's Warranties. Buyer makes the following representations, warranties and covenants as of the date of this Agreement and as of the date of Closing, and such warranties and covenants shall survive the Closing. The warranties provided in this Section 16 and its subparagraphs shall be enforceable by the Seller and its successors and assigns.

A. Authorization. Buyer has full power and authority to execute and deliver all documents required to consummate this transaction and to perform its obligations thereunder. Without limiting the generality of the foregoing, the governing authority of Buyer has duly authorized the execution, delivery, and performance of this Agreement by Buyer. This Agreement constitutes the valid and legally binding obligation of Buyer, enforceable in accordance with its terms and conditions.

B. Future Expenses. Buyer shall pay all expenses that shall be necessary or desirable after the date of execution of this Agreement to complete preparation of the Land for the operation of the Landfill as contemplated by this Agreement and by the Management Agreement, including, but not limited to, the cost of moving and installing the Building on the Land; the cost of installing electricity, water, telephone service and other utilities to the Building; the cost of constructing a parking lot near and about the Building; and all engineering and other services.

SECTION SEVENTEEN
NOTICES

Any notice or designation to be given hereunder shall be given by placing the notice or designation in the United States mail, certified or registered, properly stamped and addressed to the address shown below or such other address as the respective party may direct in writing to the other, or by personal delivery to such address by a party, or by a delivery service which documents delivery, and such notice or designation shall be deemed to be received upon such placing in the mails or such delivery:

SELLER: Prior to Closing:

Moulding Investments, LLC
910 West 21st Street
Ogden, Utah 84401

After Closing:

Moulding Investments, LLC
at the address of the Property

BUYER: Weber County Corporation
Attention: Commission Chair
2380 Washington Boulevard
Ogden, Utah 84401

SECTION EIGHTEEN
TERMINATION

If this Agreement is terminated or Closing does not occur because of the failure of any condition or the occurrence of an event giving rise to a termination right by Buyer as set forth herein, all monies deposited by Buyer hereunder will be returned to it. In the event of default by either party, the other party may, at its option (i) terminate this Agreement upon written notice to such defaulting party, and recover from such other party all damages incurred or suffered by such other party; or (ii) pursue all other remedies available at law or in equity, including specific performance.

SECTION NINETEEN
REAL ESTATE AGENTS AND COMMISSIONS

The Seller and Buyer hereby agree that no real estate commissions shall be due on account of the transaction contemplated herein. Each party agrees to indemnify, defend and hold the other party harmless from and against any commissions, fees or other compensation which is claimed by any third party with whom the indemnifying party has allegedly dealt.

SECTION TWENTY
ENTIRE AGREEMENT

This Agreement contains all agreements between the parties, and no agreement not contained herein shall be recognized by the parties.

SECTION TWENTY-ONE
BINDING EFFECTS

This Agreement shall be binding upon and inure to the benefit of the parties and their respective heirs, legal representatives, successors and assigns.

SECTION TWENTY-TWO
DEFAULT BY BUYER

If Buyer should default at any time during this Agreement, Buyer agrees to deliver to Seller all studies, engineering plans, and plats to Seller that were performed by Buyer.

SECTION TWENTY-THREE
DEFAULT BY EITHER PARTY

In the event of default by either party, the other party shall have the rights set forth in section 18 above, including the right of specific performance.

SECTION TWENTY-FOUR
AUTHORITY OF SIGNERS

If Buyer or Seller is a corporation, partnership, trust, estate or other entity, the person executing this Agreement on its behalf, warrants his or her authority to do so and bind Buyer or Seller.

SECTION TWENTY-FIVE
ATTORNEYS FEES

In any action arising out of this Agreement, each party hereto shall be responsible for its own costs and attorney's fees.

SECTION TWENTY-SIX
RISK OF LOSS

All risk of loss or damage to the property shall be borne by Seller until closing.

SECTION TWENTY-SEVEN
INCORPORATION OF RECITALS

The Recitals preceding this Agreement are incorporated herein as part of this Agreement by this reference.

SECTION TWENTY-EIGHT
COUNTERPARTS AND FACSIMILE SIGNATURES

This Agreement may be executed in any number of counterparts which when combined shall constitute one original. Facsimile signatures on this Agreement shall be accepted as original, with original signatures to be delivered to the parties as soon as reasonably possible thereafter.

SECTION TWENTY-NINE
NO EFFECT

This Agreement shall be void *ab initio* and of no force or effect if the Management Agreement is not executed or is for any reason invalid or unenforceable.

IN WITNESS WHEREOF the undersigned have affixed their respective signatures hereto the dates indicated below.

BUYER

BOARD OF COUNTY COMMISSIONERS
OF WEBER COUNTY

By: Jan M. Zogmaister
Jan M. Zogmaister, Chair

Commissioner Bischoff voted ______
Commissioner Dearden voted ______
Commissioner Zogmaister voted ______

STATE OF UTAH)

ss.
COUNTY OF WEBER)

I certify that the foregoing instrument was approved in a regular Commission Meeting of the Board of County Commissioners of Weber County on the 23 day of ~~November~~ December, 2008.

Alan D. McEwan, CPA
Weber County Clerk/Auditor

SELLER:

MOULDING INVESTMENTS, LLC, a
Utah limited liability company

By____________________
Randy Moulding

OGD_161406.1

EXHIBIT "A-1"

Legal Description of Property

That certain real property located in Weber County, State of Utah, more particularly described as follows:

ALL THAT PROPERTY IN THE NORTH HALF OF SECTION 19, TOWNSHIP 6 NORTH, RANGE 3 WEST, SALT LAKE BASE & MERIDIAN, IN THE STATE OF UTAH, COUNTY OF WEBER, MORE PARTICULARLY DESCRIBED AS FOLLOWS: BEGINNING AT A POINT ON THE NORTH SIDE OF A 100 FOOT PERPETUAL EASEMENT, SAID POINT BEING SOUTH 425.19 FEET AND WEST 4.17 FEET FROM THE NORTHWEST CORNER OF SAID SECTION, BASIS OF BEARING MAY BE DETERMINED LOCALLY BY A BEARING OF SOUTH 89°23'44" EAST BETWEEN THE NORTHWEST CORNER AND THE NORTHEAST CORNERS OF SAID SECTION, THENCE ALONG THE NORTH LINE OF SAID EASEMENT THE FOLLOWING FIVE COURSES, SOUTH 89°05'20" EAST 12.18 AND NORTH 87°50'35" EAST 1450.90 FEET TO THE BEGINNING OF A CURVE CONCAVE TO THE SOUTH, WITH A RADIUS OF 868.51 FEET, THENCE EASTERLY 198.57 FEET, THROUGH A CENTRAL ANGLE OF 13°06'00" AND SOUTH 79°05'14" EAST 485.59 FEET, TO THE BEGINNING OF A CURVE CONCAVE TO THE NORTH, WITH A RADIUS OF 768.51 FEET, THENCE EASTERLY 474.18 FEET, THROUGH A CENTRAL ANGLE OF 35°21'09" THENCE LEAVING SAID NORTH LINE SOUTH 1811.66 FEET TO THE NORTHERLY RIGHT OF WAY OF THE SOUTHERLY PACIFIC RAILROAD COMPANY, THENCE ALONG SAID RIGHT OF WAY THE FOLLOWING FOUR COURSES, SOUTH 81°46'35" WEST 221.51 FEET AND SOUTH 81°42'06" WEST 251.02 FEET, TO THE BEGINNING OF A CURVE CONCAVE TO THE NORTH WITH A RADIUS OF 10491.76 FEET, THENCE WESTERLY 2155.58 FEET, THROUGH A CENTRAL ANGLE OF 11°46'18", AND NORTH 89°26'02" WEST 1.88 FEET TO THE EASTERLY BOUNDARY OF THE USAF PROPERTY, THENCE LEAVING SAID RIGHT OF WAY AND ALONG SAID EASTERLY BOUNDARY THE FOLLOWING TWO COURSES, NORTH 00°33'58" EAST 1867.42 FEET AND NORTH 00°35'08" EAST 100.78 FEET TO THE POINT OF BEGINNING. CONTAINING 116.69 ACRES MORE OR LESS.
(10-040-0012)

TOGETHER WITH A PERPETUAL EASEMENT FOR ACCESS AND CONSTRUCTION OF UTILITIES, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT ON THE NORTH SIDE OF A 100 FOOT PERPETUAL EASEMENT, SAID POINT BEING SOUTH 423.16 FEET AND EAST 2595.73 FEET FROM THE NORTHWEST CORNER OF SAID SECTION 19, BASIS OF BEARING MAY BE DETERMINED LOCALLY BY A BEARING OF SOUTH 89°23'44" EAST, BETWEEN THE NORTHWEST CORNER AND THE NORTHEAST CORNERS OF SAID SECTION 19; THENCE ALONG THE NORTH LINE OF SAID EASEMENT THE FOLLOWING NINE

COURSES; EASTERLY ALONG A CURVE, CONCAVE TO THE NORTHWEST, WITH A RADIUS OF 768.51 FEET, THENCE ALONG SAID CURVE 214.24 FEET, THROUGH A CENTRAL ANGLE OF 15°58'21", AND NORTH 49°3705" EAST 309.04 FEET AND NORTH 65°33'35" EAST 139.61 FEET; AND SOUTH 00°00'25" EAST 32.86 TO THE SOUTH SIDE OF A COUNTY ROAD, AND ALONG SAID SOUTH SIDE, SOUTH 89°47'56" EAST 331.04 FEET; AND SOUTH 00°14'05" WEST 7.51, SAID POINT ALSO BEING THE BEGINNING OF A CURVE, CONCAVE TO THE SOUTHEAST, WITH A RADIUS OF 768.51 FEET, THENCE WEST AND SOUTHWESTERLY 544.84 FEET, THROUGH A CENTRAL ANGLE OF 40°37'13", AND SOUTH 49°37'05" WEST 169.04 FEET, TO THE BEGINNING OF A CURVE CONCAVE TO THE NORTHWEST, WITH A RADIUS OF 868.51 FEET, THENCE WESTERLY 286.61 FEET, THROUGH A CENTRAL ANGLE OF 18°54'28; THENCE NORTH 108.43 FEET TO THE POINT OF BEGINNING.

ALSO TOGETHER WITH ½ OF ANY AND ALL WATER, WATER RIGHTS, WATER SHARES SURFACE AND SUB-SURFACE, APPURTENANT TO, OR USED IN CONJUNCTION WITH, THE ABOVE STATED PARCEL

SUBJECT TO EASEMENTS, RESTRICTIONS AND RIGHTS OF WAY APPEARING OF RECORD AND ENFORCEABLE IN LAW.

ALSO SUBJECT TO ANY AND ALL EASEMENTS, AND EXCEPTIONS AS PERTAINING TO SUBJECT PARCEL AS DESCRIBED IN DOCUMENT ENTRY #2305658 DATED NOVEMBER 20, 2007. RECORDED WITH THE WEBER COUNTY RECORDERS OFFICE.

RECEIPT OF EARNEST MONEY

The undersigned hereby acknowledges receipt of a check in the amount of $___________ as Earnest Money under the foregoing Agreement. The undersigned will promptly cash the check and hold the proceeds as Earnest Money in accordance with the terms of the Agreement. The undersigned will promptly notify the parties if these instructions are for any reason not carried out.

____
Title Company

By_______________________________

Its_______________________________

Date:_____________________________

LANDFILL OPERATING AND MANAGEMENT AGREEMENT

MADE BY AND BETWEEN

WEBER COUNTY AND MOULDING & SONS LANDFILL, LLC

12-23

C2008-228

MANAGEMENT AGREEMENT

THIS MANAGEMENT AGREEMENT ("Agreement") is made and entered into as of the 23 day of December, 2008, by and between Weber County, a body politic, corporate and political subdivision of the State of Utah ("County"), and Moulding & Sons Landfill, LLC ("Manager"), a Utah limited liability company.

RECITALS

WHEREAS, County has purchased property located at approximately 10000 West 900 South in Weber County, Utah, for the purpose of operating a Construction and Demolition Landfill; and

WHEREAS, Manager has significant experience in managing and operating construction and demolition landfills; and

WHEREAS, the County desires to engage Manager, and Manager desires to accept such engagement, to provide management services for the Landfill on the terms and conditions set forth herein;

NOW, THEREFORE, in consideration of the mutual premises, covenants and agreements herein contained, the parties hereto, intending to be legally bound, hereby agree as follows:

SECTION ONE
DEFINITIONS

For purposes of this Agreement, the following terms have the meanings referred to in this Section One:

"Board" means the Board of County Commissioners of Weber County.

"Solid Waste" means any waste that may be received by a Class IVb landfill pursuant to Utah Administrative Code Rules 315-301-2(10) and 315-305-3(2) as of the date of execution of this Agreement.

"Contract Administrator" means the chair of the Board or his/her designee.

"Fiscal Year" means a one year period beginning January 1 and ending December 31.

"Landfill" means the Class IVb Landfill located at approximately 10000 West 900 South in Weber County, Utah.

"Laws" means all federal, state, local and municipal regulations, ordinances, statutes, rules, laws and constitutional provisions.

"Losses" means any and all losses, liabilities, claims, damages and expenses.

"Manager" means Moulding & Sons Landfill, LLC., as defined in the first paragraph of this Agreement.

"Operating Expenses" means (a) any and all expenses and expenditures of whatever kind or nature incurred, directly or indirectly, by Manager in operating, maintaining and managing the Landfill, including, but not limited to: employee compensation and related expenses, supplies, material and parts costs, costs of any independent contractors, repairs and maintenance costs, the costs of procuring and maintaining the insurance referred to in Section 8 below, amounts expended to procure and maintain permits and licenses, taxes, excises, utility and telephone charges, safety and medical expenses, costs relating to the maintenance of signage inventory and systems, the cost of annual independent audits of the Landfill, the cost of compliance with laws and regulations, other start-up expenses associated with the opening of a new Landfill.

"Operating Revenues" means any and all revenues of every kind or nature derived from operating and managing the Landfill.

"Person" means any individual, general partnership, limited partnership, limited liability partnership, partnership, corporation, joint venture, trust, business trust, limited liability company, cooperative, or association, and the successors and assigns of any of the foregoing and, unless the context otherwise requires, the singular shall include the plural, and the masculine gender shall include the feminine and the neuter, and vice versa

"Renewal Term" means the additional period for which this Agreement may be renewed in accordance with Section 3.2 hereof beyond the Management Term.

SECTION TWO
ENGAGEMENT OF MANAGER; SCOPE OF SERVICES

2.1 Engagement.

2.1.1 General Scope. The Board hereby engages Manager to operate and manage the Landfill during the Management Term and the Renewal Term, if any, upon the terms and conditions hereinafter set forth, and Manager hereby accepts such engagement.

2.1.2 Manager of the Landfill. Subject to the terms of this Agreement, Manager shall be the sole and exclusive manager of the Landfill to manage and operate the Landfill during the Management Term and the Renewal Term(s), if any. In such capacity, Manager shall have all authority over the day-to-day operation of the Landfill and all activities therein. The County shall take no action that materially interferes with, impedes or impairs the ability of Manager to manage the Landfill effectively, except that if the Manager is in violation of any applicable federal or state law, rule or regulation, the County may direct the Manager to correct such violation, and if said violation is not corrected within a reasonable time, the County may correct the same, with said costs to be paid by Manager within thirty (30) days.

2.1.3 Approval of the Board. To the extent that the approval of the Board is required under the terms of this Agreement, the approval of the Contract Administrator shall constitute the approval of the Board, except to the extent the approval of another party is expressly required by the terms of this Agreement.

2.2 Scope of Services - Generally. Manager shall perform and furnish such management services and systems as are appropriate or necessary to operate and manage the Landfill in a manner consistent with Manager's policies and procedures and the operations of other similar facilities. In that connection, Manager will operate the Landfill in a manner to achieve the following objectives, subject to the availability of Operating Revenues.

- To provide excellent service to the users of the Landfill;
- To maximize the utilization of the Landfill and its revenue generating capacity;
- To provide for the safety of the persons visiting the Landfill;
- To respond to the changing needs of the community and users of the Landfill with expansions and/or upgrades of services;

2.3 Specific Services. Without limiting the generality of the foregoing, Manager shall have, without (except as otherwise expressly noted below) any prior approval by the County, sole right and authority to:

2.3.1 employ, supervise and direct employees and personnel consistent with the provisions of this Agreement;

2.3.2 negotiate, execute in its name as agent for the County, deliver and administer any and all licenses which are necessary or appropriate and all other contracts and agreements in connection with the management and operation of the Landfill.

2.3.3 rent, lease or purchase all equipment and maintenance supplies necessary or appropriate for the operation and maintenance of the Landfill;

2.3.4 charge the prices and rates set forth on the rate schedule which is attached hereto as Exhibit "A" and by this reference incorporated herein, and, subject to the approval of the Board (which approval shall not be unreasonably withheld, conditioned or delayed), to determine any adjustments thereto;

2.3.5 pay, when due, all Operating Expenses from accounts established pursuant to Section 5.2 of this Agreement;

2.3.6 maintain a record of the amount of all Solid Waste accepted at the Landfill;

2.3.7 provide day-to-day administrative services in support of its management activities, including, but not limited to, the acquisition of services, equipment, supplies and facilities; internal budgeting and accounting; maintenance and property management; personnel management; record-keeping; collections and billing; and similar services.

2.4 **Right of Entry Reserved.** The Board or any designated representative shall have the right to enter all portions of the Landfill during regular business hours for any lawful purpose and to inspect same, to observe the performance of Manager of its obligations under this Agreement, to install, remove, adjust, repair, replace or otherwise handle any utility lines, or other matters in, on, or about the premises, or to do any act or thing which the Board may be obligated or have the right to do under this Agreement or otherwise. Except for emergency situations or to remedy violations of federal or state law, rules or regulations in accordance with Section 2.1.2 above, the Manager shall be given not less than twenty-four (24) hours prior written notice of such intended entry. Nothing contained in this Section is intended or shall be construed to limit any other rights of the Board under this Agreement.

SECTION THREE
TERM AND RENEWAL

3.1 **Management Term and Renewal Term.** The Management Term of this Agreement shall commence on the Closing Date under the Real Estate Purchase Agreement of even date herewith between the County and Moulding Investments, LLC, a Utah limited liability company, pursuant to which the County has purchased the real property on which the Landfill will be operated (the "Purchase Agreement"), and shall end at midnight on the date which is twenty (20) years thereafter, unless earlier terminated pursuant to the provisions of this Agreement.

3.2 **Contract Extension.** The Board and Manager may agree to extend the term hereof upon the same terms and conditions except for modifications which may be made as specified herein for two (2) additional five (5) year periods by executing an addendum to this Agreement at least one hundred eighty (180) days prior to the expiration of the Management Term or any Renewal Term.

SECTION FOUR
COMPENSATION TO COUNTY

4.1 **Compensation.** Manager shall pay County on a monthly basis One Dollar and Fifty Cents ($1.50) for each ton (or the equivalent thereof) of Solid Waste accepted at the Landfill, with an increase to be negotiated every five (5) years between Manager and County or, if Manager and County are unable to agree on such increase, said payment shall be increased by an amount equal to the percentage increase, if any, in the applicable consumer price index published by the United States government since the last such increase.

SECTION FIVE
FUNDING, BUDGET, BANK ACCOUNTS

5.1 **Operating Funds**. Manager shall be responsible for all funds necessary to pay all Operating Expenses incurred or accrued in each Fiscal Year.

5.2 **Receipts and Disbursements**. Manager shall establish and maintain in one or more depositories one or more operating, payroll and other bank accounts for the operation and management of the Landfill, in the name of the Manager, with signature authority in such employees of Manager as Manager shall determine. All revenues collected by Manager from the operation of the Landfill shall be deposited into such accounts and Operating Expenses shall be paid therefrom by Manager.

5.3 **Capital Improvements; Capital Equipment**. The obligation to pay for, and authority to perform, direct and supervise capital improvements and capital equipment purchases shall be the responsibility of the Manager.

5.4 **Landfill Closure**. Manager shall establish a closure account separate from the operating account for the purpose of building a closure fund. Manager shall deposit in the closure fund the equivalent of $.20 per ton (or the equivalent thereof) for the purpose of accumulating funds sufficient to close the Landfill in accordance with applicable federal and state laws, rules and regulations. Any funds remaining in said account after completing Manager's services under this Agreement in accordance with said laws, rules and regulations shall belong to Manager; provided, however, that in the event County continues to operate the Landfill following termination of this Agreement, said closure fund shall be held in an interest bearing escrow account until closure, whereupon all remaining funds in excess of closure costs shall be returned to Manager.

SECTION SIX
RECORDS, AUDITS AND REPORTS

6.1 **Records and Audits**.

6.1.1 Manager shall keep and preserve for at least three (3) years following each Fiscal Year all records relating to the number of tons (or the equivalent thereof) of Solid Waste accepted at the Landfill.

6.1.2 The Board shall have the right, annually, upon at least seven (7) days prior written notice, to cause one or more of the County's internal auditors to audit the books of Manager at the Landfill's business office relating to the number of tons (or the equivalent thereof) of Solid Waste accepted at the Landfill.

6.2 Monthly Reports. By the twenty-fifth day of each month, Manager shall provide to the Board a written report showing the number of tons (or the equivalent thereof) of Solid Waste accepted at the Landfill during the previous calendar month.

SECTION SEVEN
EMPLOYEES

7.1 Manager Employees.

7.1.1 Manager shall select, train and employ at the Landfill such number of employees as Manager deems necessary or appropriate to satisfy its responsibilities hereunder. Manager shall have authority to hire, terminate and discipline any and all personnel working at the Landfill.

7:1.2 Manager's employees at the Landfill shall not for any purpose be considered to be employees of the Board and Manager shall be solely responsible for their supervision and daily direction and control and for setting, and paying as an Operating Expense, their compensation (and federal income tax withholding) and any employee benefits, and all costs related to their employment shall be an Operating Expense.

SECTION EIGHT
INDEMNIFICATION AND INSURANCE

8.1 Indemnification.

8.1.1 Each party shall indemnify, defend and hold harmless the other party and its officers, agents and employees from and against any and all claims and judgments arising from any the negligence, fault, material default or breach by such indemnifying party of its obligations specified herein.

8.1.2 The provisions set forth in subparagraph 8.1.1 above shall survive termination of this Agreement; provided, however, that a claim for indemnification shall be valid only if the party entitled to such indemnification provides written notice thereof to the other party prior to three (3) years following the date of termination of this Agreement.

8.1.3 The foregoing indemnification rights shall be the exclusive remedies of each party hereto, other than any right to terminate this Agreement arising from any breach of, default under or performance pursuant to this Agreement.

8.2 **Liability Insurance**

8.2.1 Manager shall secure prior to the commencement of the Management Term hereunder and shall keep in force at all times during the term of this Agreement, commercial liability insurance, including public liability and property damage, covering premises liability, and Manager operations hereunder, in the amount of One Million Dollars ($1,000,000.00) for bodily injury and One Million Dollars ($1,000,000.00) for property damage.

8.2.2 Manager shall also maintain Comprehensive Automotive Bodily Injury and Property Damage Insurance for business use covering all vehicles operated by Manager officers, agents and employees in connection with the Landfill, whether owned by Manager, the Board, or otherwise, with a combined single limit of not less than One Million Dollars ($1,000,000.00) per occurrence (including an extension of hired and non-owned coverage).

8.2.3 Commencing with the Management Term and continuing thereafter during the term hereof, Manager shall also maintain employment practices liability insurance with coverage of at least One Million Dollars $1,000,000.00) for claims relating to the employment practices of Manager at the Landfill pertaining to its employees.

8.2.4 Manager shall be the named insured under all such insurance. The Board and County shall be an additional insured under the insurance described herein.

8.2.5 Certificates evidencing the existence of the above insurance shall be delivered to the Contract Administrator prior to the commencement of the Management Term. Notwithstanding the provisions of this Section 8.2, the parties hereto acknowledge that the above insurance may contain exclusions from coverage which are reasonable and customary for insurance of such type.

8.2.6 A renewal binder of coverage (or satisfactory evidence of such renewal) shall be delivered to the Contract Administrator at least twenty (20) days after a policy's expiration date except for any policy expiring on the termination date of this Agreement or thereafter.

8.2.7 Except as provided in Section 8.5, all insurance procured by Manager in accordance with the requirements of this Agreement shall be primary over any insurance carried by the Board and not require contribution by the Board.

8.3 **Workers Compensation Insurance.** Manager shall at all times maintain worker's compensation insurance (including occupational disease hazards) with an authorized insurance company or through an authorized self-insurance plan approved by the State of Utah, insuring its employees at the Landfill in amounts equal to or greater than required under law. Manager shall defend, indemnify and hold harmless the Board and County from any and all actions brought for workers compensation benefits.

SECTION NINE
OWNERSHIP OF ASSETS

9.1 **Ownership.** The ownership of any permanent buildings and real estate located at the Landfill shall remain with the County. Ownership of removable buildings, heavy equipment, furnishings, materials, technical and office equipment and facilities, furniture, displays, fixtures, vehicles and similar tangible property or fixtures not considered to be real property and other personal property furnished by Manager shall remain with Manager. The assets of a party as described herein shall not be pledged, liened, encumbered or otherwise alienated or assigned other than in the ordinary course of business of the Landfill without the prior approval of the other party.

SECTION TEN
ASSIGNMENT

10.1 **Assignment.** Neither this Agreement nor any of the rights or obligations hereunder may be assigned by either party hereto without the prior written consent of the other party hereto.

SECTION ELEVEN
LAWS AND PERMITS

11.1 **Permits, Licenses, Taxes and Liens.** Manager, as agent for the County, shall use reasonable efforts to procure any permits and licenses required for the business to be conducted by it hereunder. The Board shall cooperate with Manager in applying for such permits and licenses. Manager shall deliver copies of all such permits and licenses to the Contract Administrator. Manager shall pay promptly out of the accounts specified in Section 5.2, all taxes, excises, license fees and permit fees of whatever nature arising from its operation, promotion and management of the Landfill. Manager shall use reasonable efforts to prevent mechanic's or materialman's or any other lien from becoming attached to the premises or improvements at the Landfill, or any part or parcel thereof, by reason of any work or labor performed or materials furnished by any mechanic or materialman, so long as the work, labor or material was provided at Manager's direction and the County has supplied funds for the payment of charges therefor in accordance with this Agreement.

11.2 **Governmental Compliance.** Manager, its officers, agents and employees shall comply with all Laws applicable to Manager's management of the Landfill hereunder.

SECTION TWELVE
TERMINATION

12.1 **Termination.** This Agreement shall be terminated:

12.1.1 upon expiration of the term hereof;

12.1.2 upon ninety (90) days written notice by either party to the other party ("Voluntary Termination");

12.1.3 by either party if the other party fails to pay any sum payable hereunder or fails in any material respect to perform or comply with any of the other terms, covenants, agreements or conditions hereof, and such failure continues for more than sixty (60) days after written notice thereof from the other party ("Default"); provided, however, that in the event that a Default (other than a Default in the payment of money) is not reasonably susceptible to being cured within the sixty (60) day period, the defaulting party shall not be considered in Default if it shall within such sixty (60) day period have commenced with due diligence and dispatch to cure such Default and thereafter completes with dispatch and due diligence the curing of such Default;

12.1.4 if the Solid Waste flow to the Landfill diminishes to the point that continued operation of the Landfill is no longer economically feasible ("Lack of Economical Viability"); or

12.1.5 by County upon the commission of an act by Manager that is inimical to public operations or which brings disrepute to the County ("Cause").

12.2 **Effect of Termination.**

12.2.1 Upon termination of this Agreement for any reason other than Manager's Voluntary Termination, Manager's Default, Lack of Economical Viability or Cause, County shall pay Manager an amount equal to the then rate of compensation per ton (or the equivalent thereof) which is payable by Manager to the County pursuant to Section 4.1 above for each ton (or the equivalent thereof) of Solid Waste that can be deposited in the Remaining Airspace of the Landfill (as defined in Section 12.3 below). If the Landfill continues to be operated, said amount shall be paid monthly as the remaining airspace of the Landfill is filled; otherwise it shall be paid within thirty (30) days after determination thereof as provided in said Section 12.3.

12.2.2 Upon termination of this Agreement for Cause, Manager may repurchase the Landfill and seek to have it permitted and licensed as a private C&D Landfill. County agrees to fully cooperate with Manager in obtaining all applicable permits and licenses. The purchase price shall be the amount the County paid for the Landfill, plus any additional expense the County made in developing, permitting or upgrading the Landfill, adjusted by a consumer price index for the number of years the County owned the Landfill, which total amount shall be multiplied by a fraction, the numerator of which is the Remaining Airspace of the Landfill (as defined in Section 12.3 below), and the denominator of which shall be the number of tons (or the equivalent thereof) of Solid Waste that can be deposited in the Landfill as of the date of this Agreement, as determined by Manager's engineer, to-wit: Seven Million Five Hundred Thousand (7,500,000) tons ("Initial Airspace").

12.2.3 Upon termination of this Agreement for any reason, (a) all Operating Expenses incurred or committed for prior to the date of expiration or termination and any unpaid compensation due to the County pursuant to Section 4.1 shall be paid using funds on deposit in the account(s) described in Section 5.2 and to the extent such funds are not sufficient, the Manager shall pay all such Operating Expenses and shall indemnify and hold the Board harmless therefrom; and (b) all further obligations of the parties hereunder shall terminate except for the obligations in this Section Twelve and in Section 8.1.

12.3 **Remaining Airspace.** The Remaining Airspace of the Landfill shall be the difference between (a) the Initial Airspace (as defined in Section 12.2.2 above, and (b) the number of tons (or the equivalent thereof) of Solid Waste that has been accepted at the Landfill as of the date of termination of this Agreement, as set forth in the records maintained by Manager pursuant to Section Six hereof.

12.4 **Surrender of Premises.** Upon termination of this Agreement for any reason specified in this Section 12, including expiration of this Agreement, Manager shall surrender and vacate the Landfill upon the effective date of such termination.

SECTION THIRTEEN
MISCELLANEOUS

13.1 **Dispute Resolution.** Any dispute arising under or in connection with this Agreement will be resolved by the parties in accordance with the procedures set forth on Exhibit "B" attached hereto.

13.2 **No Partnership or Joint Venture.** Nothing herein contained is intended or shall be construed in any way to create or establish the relationship of partners or a joint venture between the Board and Manager. None of the officers, agents or employees of Manager shall be or be deemed to be employees of the Board for any purpose whatsoever.

13.3 **Entire Agreement.** This Agreement contains the entire agreement between the parties with respect to the subject matter hereof and supersedes all prior agreements and understandings with respect thereto. No other agreements, representations, warranties or other matters, whether oral or written, will be deemed to bind the parties hereto with respect to the subject matter hereof.

13.4 **Written Amendments.** This Agreement shall not be altered, modified or amended in whole or in part, except in a writing executed by each of the parties hereto.

13.5 **Force Majeure.**

13.5.1 No party will be liable or responsible to the other party for any delay, damage, loss, failure, or inability to perform caused by "Force Majeure" if notice is provided to the other party within ten (10) days of date on which such party gains actual knowledge of the event of "Force Majeure" that such party is unable to perform. The term "Force Majeure" as used in this Agreement means the following: an act of God, strike, war, public rioting, lightning, fire, storm, flood, explosions, inability to obtain materials, supplies, epidemics, landslides, lightening storms, earthquakes, floods, storms, washouts, civil disturbances, explosions, breakage or accident to machinery or lines of equipment, temporary failure of equipment, freezing of equipment, terrorist acts, and any other cause whether of the kinds specifically enumerated above or otherwise which is not reasonably within the control of the party whose performance is to be excused and which by the exercise of due diligence could not be reasonably prevented or overcome (it being acknowledged that under no circumstances shall a failure to pay amounts due and payable hereunder be excusable due to a Force Majeure).

13.5.2 Neither party hereto shall be under any obligation to supply any service or services if and to the extent and during any period that the supplying of any such service or services or the provision of any component necessary therefor shall be prohibited or rationed by any Law.

13.5.3 Except as otherwise expressly provided in this Agreement, no abatement, diminution or reduction of the payments payable to Manager shall be claimed by the Board or charged against Manager, nor shall Manager be entitled to additional payments beyond those provided for in this Agreement for any inconvenience, interruption, cessation, or loss of business or other loss caused, directly or indirectly, by priorities, rationing, or curtailment of labor or materials, or by war or any matter or thing.

13.5.4 In the event of damage to or destruction of the Landfill by reason of fire, storm or other casualty or occurrence of any nature or any regulatory action or requirements that, in either case, is expected to render the Landfill permanently untenantable, notwithstanding the Board's reasonable efforts to remedy such situation, either party may terminate this Agreement upon written notice to the other.

13.5.5 Manager may suspend performance required under this Agreement, without any further liability, in the event of any act of God or other occurrence, which act or occurrence is of such effect and duration as to effectively curtail the use of the Landfill so as effect a substantial reduction in the need for the services provided by Manager for a period in excess of ninety (90) days; provided, however, that for the purposes of this subsection, Manager shall have the right to suspend performance retroactively effective as of the date of the use of the Landfill was effectively curtailed. "Substantial reduction in the need for these services provided by Manager" shall include such a reduction as shall make the provision of any services by Manager economically impractical.

13.6 Binding Upon Successors and Assigns; No Third-Party Beneficiaries.

13.6.1 This Agreement and the rights and obligations set forth herein shall inure to the benefit of, and be binding upon, the parties hereto and each of their respective successors and permitted assigns.

13.6.2 This Agreement shall not be construed as giving any Person, other than the parties hereto and their successors and permitted assigns, any legal or equitable right, remedy or claim under or in respect of this Agreement or any of the provisions herein contained, this Agreement and all provisions and conditions hereof being intended to be, and being, for the sole and exclusive benefit of such parties and their successors and permitted assigns and for the benefit of no other Person.

13.7 Notices. Any notice, consent or other communication given pursuant to this Agreement will be in writing and will be effective either (a) when delivered personally to the party for whom intended, (b) on the second business day following mailing by an overnight courier service that is generally recognized as reliable, (c) on the fifth day following mailing by certified or registered mail, return receipt requested, postage prepaid, or (d) on the date transmitted by telecopy as shown on the telecopy confirmation therefor as long as such telecopy transmission is followed by mailing of such notice by certified or registered mail, return receipt requested, postage prepaid, in any case addressed to such party as set forth below or as a party may designate by written notice given to the other party in accordance herewith.

13.8 To the Manager and Board:

To Manager:

Prior to opening of the Landfill:

Moulding & Sons Landfill, LLC
910 West 21st Street
Ogden, Utah 84401

After opening of the Landfill:

Moulding & Sons Landfill, LLC
at the address of the Landfill

To County:

Weber County Corporation
2380 Washington Blvd.
Ogden, Utah 84401

13.9 Section Headings and Defined Terms. The section headings contained herein are for reference purposes only and shall not in any way affect the meaning and interpretation of this Agreement. The terms defined herein and in any agreement executed in connection herewith include the plural as well as the singular and the singular as well as the plural, and the use of masculine pronouns shall include the feminine and neuter. Except as otherwise indicated, all agreements defined herein refer to the same as from time to time amended or supplemented or the terms thereof waived or modified in accordance herewith and therewith.

13.10 Counterparts. This Agreement may be executed in two or more counterparts, each of which shall be deemed an original copy of this Agreement, and all of which, when taken together, shall be deemed to constitute but one and the same agreement.

13.11 Severability. The invalidity or unenforceability of any particular provision, or part of any provision, of this Agreement shall not affect the other provisions or parts hereof, and this Agreement shall be construed in all respects as if such invalid or unenforceable provisions or parts were omitted.

13.12 Non-Waiver. A failure by either party to take any action with respect to any default or violation by the other of any of the terms, covenants, or conditions of this Agreement shall not in any respect limit, prejudice, diminish, or constitute a waiver of any rights of such party to act with respect to any prior, contemporaneous, or subsequent violation or default or with respect to any continuation or repetition of the original violation or default.

13.13 Consent. Wherever the consent or approval of a party is required under the terms of this Agreement, the party whose consent or approval is required shall not unreasonably withhold or delay such consent or approval.

13.14 Certain Representations and Warranties.

13.14.1 The Board represents and warrants to Manager the following: (i) all required approvals have been or will be obtained, and the Board has full legal right, power and authority to enter into and perform its obligations hereunder, and (ii) this Agreement has been duly executed and delivered by the Board and constitutes a valid and binding obligation of the Board, enforceable in accordance with its terms, except as such enforceability may be limited by bankruptcy, insolvency, reorganization or similar laws affecting creditors' rights generally or by general equitable principles.

13.14.2 Manager represents and warrants to the Board the following: (i) all required approvals have been or will be obtained, and Manager has full legal right, power and authority to enter into and perform its obligations hereunder, and (ii) this Agreement has been duly executed and delivered by Manager and constitutes a valid and binding obligation of Manager, enforceable in accordance with its terms, except as such enforceability may be limited by bankruptcy, insolvency, reorganization or similar laws affecting creditors' rights generally or by general equitable principles.

13.15 **Governing Law.** This Agreement will be governed by and construed in accordance with the internal laws of the State of Utah, without giving effect to otherwise applicable principles of conflicts of law.

13.16 **No Effect.** This Agreement shall be void *ab initio* and of no force or effect if the Purchase Agreement is not executed or is for any reason invalid or unenforceable.

[Signature Page Follows]

IN WITNESS WHEREOF, this Agreement has been duly executed by the parties hereto as of the day and year first above written.

BOARD OF COUNTY COMMISSIONERS
OF WEBER COUNTY

By Jan M. Zogmaister
Jan M. Zogmaister, Chair

Commissioner Bischoff voted ______
Commissioner Dearden voted ______
Commissioner Zogmaister voted ______

ATTEST:

Alan D. McEwan, CPA
Weber County Clerk/Auditor

MOULDING & SONS LANDFILL, LLC

By: ______
Randy Moulding, Manager

EXHIBIT "A"

RATE SCHEDULE

Pickups	$ 50.00
Pickups with Sides	60.00
Small Trailers	100.00
Bobtails	100.00
Small Flatbeds	100.00
Large Trailers	150.00
Large Flatbeds	150.00
Dump Trucks	150.00
Dump Trucks with Pups	240.00
Small End Dumps	160.00
End Dumps	240.00
Large End Dumps	320.00
Roll-Offs	8.00 per yard

EXHIBIT "B"

COOPERATION/MEDIATION

(a) The parties desire to cooperate with each other in the management and operation of the Landfill pursuant to the terms hereof. In keeping with this cooperative spirit and intent, any dispute arising hereunder will first be referred to the parties' respective agents or representatives prior to either party initiating a legal suit, who will endeavor in good faith to resolve any such disputes within the limits of their authority and within forty-five (45) days after the commencement of such discussions. If and only if any dispute remains unresolved after the parties have followed the dispute resolution procedure set forth above, the matter will be resolved pursuant to paragraphs (b) and (c) below.

(b) If any dispute between the parties has not been resolved pursuant to paragraph (a) above, the parties will endeavor to settle the dispute by mediation under the then current CPR Institute for Dispute Resolution ("CPR") model procedure for mediation of business disputes or, if such model procedure no longer exists, some other mutually agreeable procedure. Within ten (10) business days from the date that the parties cease direct negotiations pursuant to paragraph (a) above, the Board shall provide Manager with a list of three (3) individuals then listed on CPR's U.S. Regional Panel of Distinguished Neutrals for the locale in which the Landfill is located (or if no such list exists for the locale closest to where the Landfill is located), who are available during the time period contained in subparagraph (e) below and who have no unwaived conflict of interest with respect to either Party, and Manager shall (within ten (10) business days after receipt of such list) select one (1) of the neutrals from such list. Each party will bear its own cost of mediation; provided, however, the cost charged by any independent third party mediator will be borne equally by the parties. In the mediation, each Party may be represented by their own counsel.

(c) The parties agree that any mediation proceeding (as well as any discussion pursuant to paragraph (a) above) will constitute settlement negotiations for purposes of the federal and state rules of evidence and will be treated as non-discoverable, confidential and privileged communication by the parties and the mediator. No stenographic, visual or audio record will be made of any mediation proceedings or such discussions. All conduct, statements, promises, offers and opinions made in the course of the mediation or such discussion by any party, its agents, employees, representatives or other invitees and by the mediator will not be discoverable nor admissible for any purposes in any litigation or other proceeding involving the parties and will not be disclosed to any third party.

(d) The parties agree that this mediation procedure will be obligatory and participation therein legally binding upon each of them. In the event that either party refuses to adhere to the mediation procedure set forth in this Exhibit "B", the other party may bring an action to seek enforcement of such obligation in any court of competent jurisdiction.

(e) The parties' efforts to reach a settlement of any dispute will continue until the conclusion of the mediation proceeding. The mediation proceeding will be concluded when: (I) a written settlement agreement is executed by the parties, or (ii) the mediator concludes and informs the parties in writing that further efforts to mediate the dispute would not be useful, or (iii) the parties agree in writing that an impasse has been reached. Notwithstanding the foregoing, either party may withdraw from the mediation proceeding without liability therefor in the event the dispute is not resolved within forty-five (45) days from the commencement of such proceeding. For purposes of the preceding sentence, the proceeding will be deemed to have commenced following the completion of the selection of a mediator as provided in paragraph (b).

(f) If any dispute has not been resolved pursuant to the foregoing, each party is free to file suit in a court of competent jurisdiction to enforce its rights hereunder.

(g) The procedure specified in this Exhibit "B" shall be the sole and exclusive procedures for the resolution of disputes between the parties arising out of or relating to this Agreement; provided, however, that a party, without prejudice to the above procedures, may file a complaint to seek a preliminary injunction or other provisional judicial relief, if in its sole discretion such action is necessary to avoid irreparable damage or to preserve the status quo ("**Equitable Litigation**"). Despite such action, the parties will continue to participate in good faith in the procedures specified in this Exhibit "B".

(h) Any interim or appellate relief granted in such Equitable Litigation shall remain in effect until the alternative dispute resolution procedures described in this Exhibit "B" concerning the dispute that is the subject of such Equitable Litigation result in a settlement agreement or terminate. Any such written settlement agreement shall be the final, binding determination on the merits of such dispute, shall supersede and nullify any decision in the Equitable Litigation, and shall preclude any subsequent litigation on such merits, notwithstanding any determination to the contrary in connection with any Equitable Litigation granting or denying interim relief or any appeal therefrom.

(i) All applicable statutes of limitation and defenses based upon the passage of time shall be tolled while the procedures specified in this Exhibit "B" are pending. The parties will take such action, if any, required to effectuate such tolling. Each party shall be required to perform its obligations under this Agreement pending final resolution of any dispute arising out of or relating to this Agreement, unless to do so would be impossible or impracticable under the circumstances.

EXHIBIT C

A CULTURAL RESOURCE INVENTORY OF A PROPOSED LANDFILL NEAR LITTLE MOUNTAIN WEBER COUNTY, UTAH

Prepared for:
Hansen, Allen & Luce, Inc
6771 South 900 East
Midvale, Utah 84047

Prepared by:
Sagebrush Consultants, LLC
3670 Quincy Avenue, Suite 203
Ogden, Utah 84403

Under the Authority of:
Archaeological Survey Permit No. 58
United States Antiquities Permit No. U-08-SJ-0527p
Cultural Resource Report No. 1696

June 26, 2008

ABSTRACT

In June 2008, Hansen, Allen, and Luce, Inc. of Midvale, Utah, requested that Sagebrush Consultants, L.L.C. (Sagebrush) of Ogden, Utah, conduct a cultural resource inventory of a proposed landfill near Little Mountain in Weber County, Utah. The survey consists of 112 acres located about 15 miles west of Ogden on privately owned lands in T 6N., R. 3W., Sec 19 on the USGS 7.5' Quadrangle Ogden Bay, Utah (1991). The purpose of this inventory is to identify cultural resources that may be present within the proposed project area. Sagebrush carried out the fieldwork on June 19, 2008. The project was conducted under Archaeological Survey Permit No. 58, issued by the Public Lands Policy Coordination Office and Utah State of Utah Antiquities Project No. U-08-SJ-0527p.

The inventory resulted in the identification of one historic campsite, 42WB445, and one rock quarry, 42WB446. Due to their proximity to the Lucin Cutoff, as well as datable artifacts found at the campsite, it is highly likely that these two sites are related to the construction of the cutoff. Site 42WB445 is an historic campsite with eight depressions and a surficial scatter of aqua and amethyst glass, porcelain, brick fragments, and tin can fragments. Site 42WB446 is an abandoned rock quarry that has filled with water. Both sites were recommended eligible to the National Register of Historic Places due to their association with the significant historic site, the Lucin Cutoff.

The railroad construction camp (42WB445) and the railroad quarry (42WB446) have been recommended eligible to the NRHP. Both sites are located on the northwestern periphery of the project area, and can easily be avoided by landfill activities. Sagebrush recommends that these sites be avoided during construction and use of the landfill area.

This investigation was conducted with techniques that are considered to be adequate for evaluating cultural resources that are available for visual inspection and could be adversely affected by the proposed project. Based on the above-mentioned avoidance, cultural resource clearance is recommended for the current project. However, should such resources be discovered during construction, a report should be made immediately to the State Archaeologist at the Utah State Historic Preservation Office, Salt Lake City, Utah.

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INTRODUCTION

In June 2008, Hansen, Allen, and Luce, Inc. of Midvale, Utah, requested that Sagebrush Consultants, L.L.C. (Sagebrush) of Ogden, Utah, conduct a cultural resource inventory of a proposed landfill near Little Mountain in Weber County, Utah. The survey consists of 112 acres located about 15 miles west of Ogden on privately owned lands in T 6N., R. 3W., Sec 19 on the USGS 7.5' Quadrangle Ogden Bay, Utah (1991). The purpose of this inventory is to identify cultural resources that may be present within the proposed project area. Sandy Chynoweth Pagano, Alyssa Wallin, Kurt Raffield, and Joe Taylor of Sagebrush carried out the fieldwork on June 19, 2008. The project was conducted under Archaeological Survey Permit No. 58, issued by the Public Lands Policy Coordination Office and Utah State of Utah Antiquities Project No. U-08-SJ-0527p.

A file search for previous archaeological projects and cultural resources was performed by Marty Thomas for Sagebrush at the Division of State History, Utah State Preservation Office (SHPO) on June 1 and 6, 2006. Five previous cultural resource projects have been conducted near the current project area. Arie Leeflang, of the Utah State Historic Preservation Office, Antiquities Division conducted a GIS file search for the project on June 18, 2008. The results of this search indicated that five cultural resource inventories and two cultural resource sites have been recorded within one mile of the current project area. Following is a brief description of these projects and the cultural resource sites:

In 2005 Sagebrush Consultants conducted a Class III inventory of a portion of the Ogden Bay Wildlife Management Area (Polk and Pagano 2006). Two historic sites were recorded within one mile of the current project area (42WB348 and 42WB427).

> **Site 42WB348** is the Lucin Cutoff corridor. The Lucin Cutoff, constructed in 1902-1904, is a 103 mile railroad that spanned the Great Salt Lake. The site was originally documented in 2001 and recommended eligible to the National Register of Historic Places (NRHP)(Ellis et al. 2001). In 2006 Sagebrush recorded a 3,730 ft segment of the Lucin Cutoff corridor. The segment was recommended to be a non-contributing component to the site's eligibility (Polk and Pagano 2006).
>
> **Site 42WB427** is an historic railroad camp associated with the Lucin Cutoff. Artifacts found at this site include fire brick fragments, metal fragments, a single fragment of opalized clear glass, a few small pieces of cut bone and numerous fragments of deteriorated tin cans. Structural remains include a stone foundation, four depressions, and three tent platforms/habitational structures. This site was recommended eligible to the NRHP under criteria A and D (Polk and Pagano 2006).

In 1989, Weber State College conducted a reconnaissance level archaeological survey of the Ogden/Weber River Marshes in conjunction with the Archaeological Technician Program

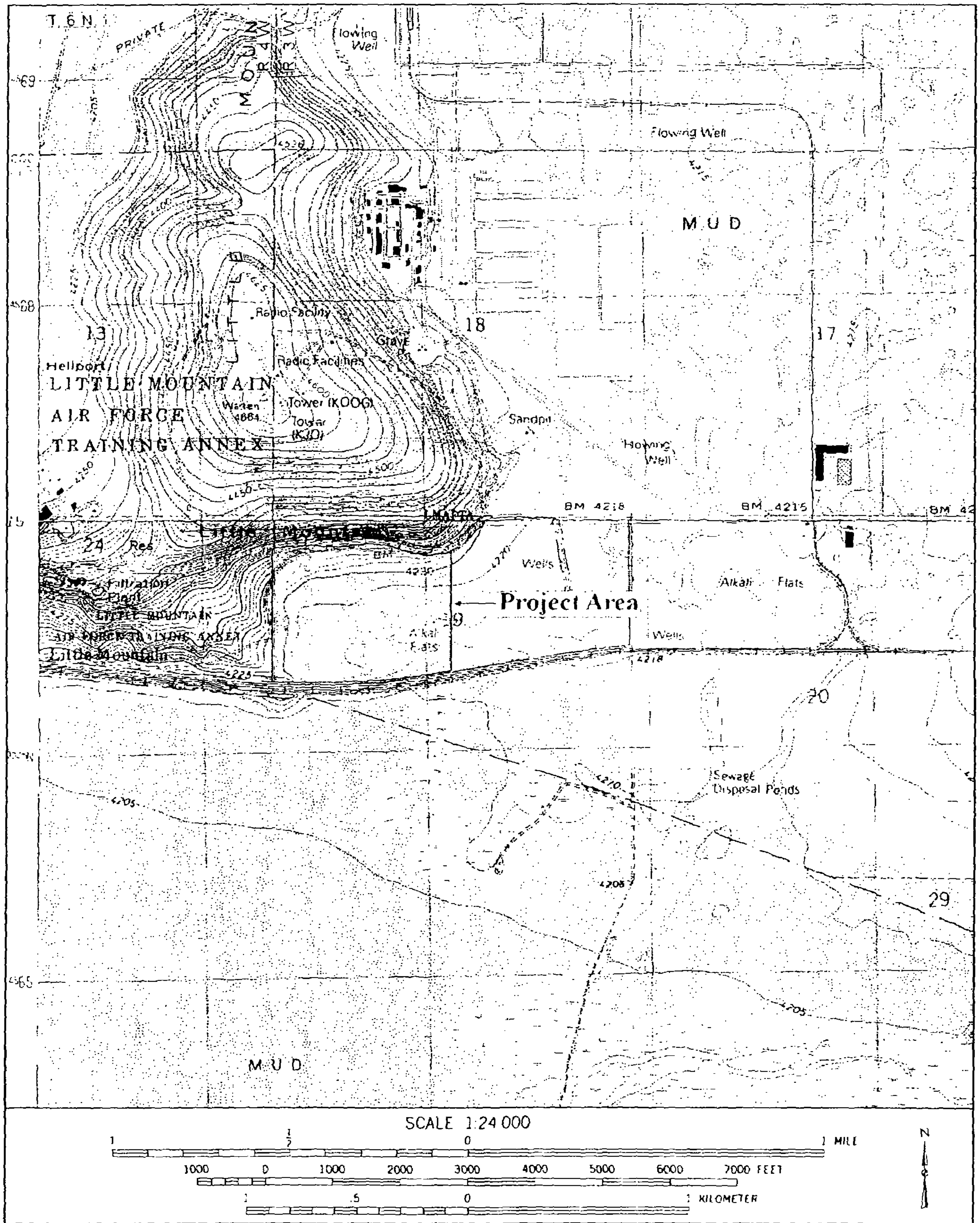

Figure 1. Location of the area surveyed for the proposed landfill near Little Mountain. Taken from USGS 7.5' Quadrangles Plain City SW, Utah (1991) and Ogden Bay, Utah (1991).

(Russell et al. 1989). Numerous previously recorded and several new cultural resource sites were noted during this inventory; however, none are within one mile of the current project area. In 1991 Utah State University Foundation conducted a sample archaeological inventory of several parcels of U. S. Air Force lands (University Foundation 1992). Numerous cultural resource sites were noted during this project; however, none are within one mile of the current project area.

In 2000 and 2001, Hill Air Force Base (HAFB) re-surveyed portions of the Little Mountain Facility for a proposed groundwater remedial investigation at the Little Mountain Test Annex (Hirschi 2000 and 2001). No cultural resource sites were located during these inventories. In 2004, Montgomery Archaeological Consultants conducted a cultural resource inventory on 114 acres of DWR land immediately adjacent to the current project area (Montgomery 2005). No cultural resources were located during the inventory.

The NRHP was also checked prior to conducting the survey. No NRHP listed sites are located within one mile of the current project area. No additional projects were conducted within one mile of the current project area.

ENVIRONMENT

The project area falls within the Great Salt Lake geographic unit of the Basin and Range near the Ogden Bay of Great Salt Lake. The project area is largely within an area of mud and alkali flats occurring along the margins of the lake. The elevation of the project area is 4205 to 4210 feet a.s.l. Vegetation consists of typical shadscale community species including pickle weed, iodine bush, saltbush, greasewood, cheatgrass, and bunch grasses. There is low ground visibility in the northern portion of the project area. The southern portion of the project area consists of mostly mud flat areas with little vegetation except in seep areas, which were characterized by stands of phragmites. Natural disturbance consists of fire and fluctuation in flood and low water stages of the Great Salt Lake. Cultural disturbance includes road and railroad construction, a quarry, recreational vehicles, a fence line, and a utility line corridor.

HISTORIC CONTEXT

The city of Ogden is known as the Crossroads of the West, due to its location in the geographical center of the western United States and the many trails, roads, and communication routes that converge and diverge in this area. The crisscrossing of trails, roads and communications routes continued throughout the historic period and continues today with fiber optic lines and pipelines being laid in the region. The current project area is located along the route of the Lucin Cutoff of the Transcontinental Railroad about 15 miles west of Ogden City, in unincorporated Weber County.

While little is known about Native American trails in the region, the first recorded paths established in northern Utah were those of the fur trappers of the Rocky Mountain Fur Company and the Hudson Bay Company, who encountered each other in the mountains east of Ogden. Following on the heels of the trappers, government explorers and surveyors crisscrossed the West, locating new routes to Oregon and California and routes for the railroad and telegraph. They in turn were followed closely by pioneers, who settled the region and built the City of Ogden, which later became the major hub for a number of railroads in the West. These railroads, like the later highways, moved traffic not only east and west, but also north and south.

The history of Ogden can be divided into seven periods, which reflects the important socioeconomic trends that occurred throughout the development of Ogden. This chronology includes Fur Trapping and Settlement, Initial Expansion, the Railroad Era, the Rise of Commercialism, Industrial Development, the Depression Era, World War II, and the International Period.

Fur Trapping and Settlement Period (1844 to 1853)

This period reflects the earliest exploratory expeditions into the Ogden area by Europeans and European-Americans. Until this time, small bands of Shoshone Indians inhabited the area. The period also reflects the initial settlement of the area by trapper Miles Goodyear in 1845 and by the Mormon pioneers in the early 1850s. During this early period, the settlement contained small, widely scattered farmsteads along the banks of the Weber and Ogden rivers.

The first Non-Native Americans to venture into Northern Utah and the Ogden area were the fur trappers and mountain men of the 1810s. Prior to that time, Utah and particularly Northern Utah, was located outside the known trapping areas, which consisted of the Pacific Northwest and the upper Missouri River (Eldredge and Gowans 1994:208). By about 1811, five American trappers with John Jacob Astor's American Fur Company, under the direction of Wilson Price Hunt, were trapping in the Snake River area and appear to have reached as far south as the Bear River (Eldredge and Gowans 1994:208). At about the same time, British trappers from the Northwest Fur Company were trapping along the Bear River and around Bear Lake (Eldredge and Gowans 1994:208). In 1819, Donald MacKenzie records that he also trapped the Bear Lake region (Eldredge and Gowans 1994:208). In 1823 and 1824, MacKenzie and Alexander Ross both lead brigades of Hudson's Bay Company trappers into the Snake River and Northern Utah regions (Eldredge and Gowans 1994:209).

By 1824, Northern Utah became the converging point for the three major competing fur interests: the trappers of the Hudson's Bay Company operating out of Oregon under the direction of Peter Skene Ogden; the American companies out of St. Louis, Missouri, represented by the

Ashley-Henry Fur Company; and the trappers licensed by the Mexican government out of Taos and Santa Fe, New Mexico, represented by men like Etienne Provost (Eldredge and Gowans 1994:209). In the spring of that year, all three interests were present in the mountains and valleys of Northern Utah. Throughout the next two years, the various parties trapped the rivers and streams of Northern Utah (Eldredge and Gowans 1994:209). In the spring of 1825, the three interests met face to face.

At Mountain Green along the Weber River, about 14 miles southeast of Ogden, fur trappers of the American-owned Rocky Mountain Fur Company led by Johnson Gardner (formerly the Ashley-Henry Fur Company), Hudson's Bay Company led by Peter Skene Ogden, and a group of Mexican trappers led by Etienne Provost encountered one another (Eldredge and Gowans 1994:210; Roylance 1982:419). Soon a discussion ensued as to who had the right to trap in the region. Provost, who probably had the best case for the right to trap the area, stayed out of the disagreement (Eldredge and Gowans 1994:210). After two days, Ogden backed down and withdrew from the immediate area. While no permanent claim was established, the fight showed that all three groups had an interest in the area and would continue to trap and trade in the area for a while to come. By 1841 fashion trends, as well as economic trends, in the east had changed and the demand for beaver pelts faded. Thus, beaver pelts were no longer in high demand and the fur trade diminished to a few trading posts that continued to trade furs in general and supply goods for those immigrants moving west (Eldredge and Gowans 1994:212).

One such trading post belonged to Miles Goodyear. In 1836, at the age of nineteen, Goodyear joined the Whitman-Spaulding missionary party on its way west to Oregon (Sadler 1994:227). However, at Fort Hall Goodyear had a change of mind and joined a group of fur trappers (Sadler 1994:227). For the next nine years, Goodyear trapped and traded with the Indians (Sadler 1994:227). In 1839 he married Ute Chief Pe-teet-neet's daughter, Pomona, with whom he had two children (Sadler 1994:227). In 1845 Goodyear began construction of a trading post on the western bank of the Weber River about a quarter to half a mile southwest of the Crossroads Historic District (Sadler 1994:227). He called his post Fort Buenaventura (Sadler 1994:227). The post was constructed of cottonwood logs set upright in the ground. The post enclosed about half an acre and was completed in 1846 (Sadler 1994:227).

In July 1847, the Mormon pioneers (members of the Church of Jesus Christ of Latter-day Saints, also known as Latter-day Saints or LDS) under the direction of their President, Brigham Young, entered the Salt Lake Valley. By the following spring, Young sent a group of settlers under the direction of Captain James Brown to explore the Ogden area and purchase the fort from Goodyear (Daughters of Utah Pioneers [DUP] 1944:58; Roberts 1994:399). The settlers renamed the fort and the small settlement that soon grew up around it, Brown's Fort or Brownsville in honor of Captain Brown (Roberts 1994:399). During the spring of 1849 and 1850, flood waters from the Weber River inundated the settlement. Thus, in early 1850, the town's people moved the settlement to the east side of the river. A new fort was constructed at approximately 29th Street and Pacific Avenue (Terry 1988:99). The next year (1851) Henry G. Sherwood officially surveyed the Ogden area and established a gridded town site, named Ogden in honor of Peter Skene Ogden of the Hudson's Bay Company (Roberts 1994:399). The new town was bounded on the north by 1st Street (now 21st Street), on the south by 9th Street (now 29th Street), on the east by East Street (now Quincy Avenue), and on the west by Franklin (now Wall Avenue) (Terry 1988:87).

Among the priorities for the new town was the need for water; thus, a major task was undertaken to bring water from the Weber and Ogden Rivers to the homes and fields in and around the town. In 1851 the settlers dug a number of small canals from the two rivers to irrigate the northern and western parts of Ogden. The following year they began construction on a seven-mile-long canal designed to bring water from the Weber River to the lower (southern and central) portion of the community (Sadler and Roberts 1994:29). This canal, the Weber Canal, was completed in 1854. In addition, they constructed a gristmill, a furniture mill, and a molasses mill along the canal to utilize the flowing water to turn the overshot mill wheels and helped establish Ogden as a permanent settlement (Sadler and Roberts 1994:30).

Initial Expansion Period (1854 to 1868)

A steady increase in the number of immigrants into Utah characterizes this period during which settlement and expansion of Ogden and the surrounding communities occurred. The number of Mormon farmsteads substantially increased during this period. The fertile fields and readily available water from the Weber and Ogden rivers, as well as the many mountain streams, were very attractive to the settlers arriving from the east and overseas. Ogden would steadily grow to become the second largest city in the Utah Territory (Powell 1994:431-438).

The 1850 census for Weber County, which consisted mainly of the Ogden area, was 1,141 people (DUP 1944:84; Roberts and Sadler 1997:63). By 1860, the community of Ogden maintained a population of 1,463 residents (DUP 1944:98,116; Roylance 1982:420). Homesteads were largely strung out along available water resources, such as streams, rivers, or near the head of a spring. Brigham Young, president of the LDS Church, envisioned Ogden becoming the headquarters for all Mormon settlements in the northern portion of the Utah Territory (DUP 1944:77). Mormon town plans called for the populace to live in town and farm the outlaying areas. In order to consolidate their resources and conform to other Mormon settlement patterns, Young encouraged many settlers to abandon their farmsteads in the surrounding areas and establish permanent homes and businesses within Ogden City (DUP 1944:77). In 1854, the areas north and northwest of the Ogden City town site were surveyed to establish definable farming plots. This survey, which covered roughly six square miles, resulted in the creation of three new communities or "districts" (DUP 1944:79). These were Bingham Fort District (Lynne) to the north, Slaterville District to the north and west, and North Ogden District to the north of Slaterville. At the same time, Ogden's northern boundary was shifted to two miles north of the Ogden River (DUP 1944:79).

Despite this geographic expansion, the bulk of the area's population remained concentrated within the town site boundaries selected by Brigham Young, primarily in the area south of 21st Street and west of Washington Boulevard (DUP 1944:77-79; Roberts and Sadler 1985:65). A few homes were constructed east of Spring Street (now Adams Avenue) and south of what is now 28th Street; however most of this area remained farmland.

During this period of Ogden's initial occupation, small bands of indigenous Shoshone Indians continued to venture through the area. While few incidents occurred between the Native Americans and the Mormon settlers, trouble did come in 1853. In July of that year, Chief Walker and his followers started fighting the settlers in Utah, Juab, Sanpete, Millard, and Iron counties (DUP 1994:85). Although the fighting did not spread as far north as Weber County, it made the Mormon settlers nervous and they feared attacks from the local bands of Shoshone (DUP 1944:85,281). Thus, the city council ordered the construction of an earthen wall around the main portion of the city (DUP 1944:85; Work Projects Administration 1940:32). The wall was to enclose the area from what is now Wall Avenue to Madison Avenue, and from 21st Street to 28th Street. Construction began immediately along Wall Avenue. In the end, only this portion of the enclosure was ever completed as the Shoshone never attacked the settlement and the Walker War came to an official end in May 1854 (DUP 1944:91; Tyler 1978:362).

Railroad Era (*1869 to 1889*)

The major event of this period was the arrival of the Union Pacific Railroad (UP) in Utah and the joining of its rails with the Central Pacific Railroad (CP) at Promontory, Utah, on May 10, 1869 (Athearn 1971:98). The Union Pacific arrived in Ogden the previous March, which had a major impact on the local economy and the surrounding areas (Bain 1999:618-19). By December 1869, Ogden became the junction and passenger transfer point for both the Central Pacific and Union Pacific (Klein 1987:422; Roberts and Sadler 1985:35). The completion of the transcontinental railroad provided the impetus for construction of seven other railroads. The Utah Central (UC) line was built between 1869 and 1870 to connect Salt Lake City to Ogden (Roberts and Sadler 1985:42). Then, between 1871 and 1878, the Utah Northern (UN) line was built to connect Logan and Brigham City to Ogden (Roberts and Sadler 1985:44). Both of these lines further increased the importance of Ogden as a center for transportation, settlement, and commerce.

Ogden's selection as the junction for the railroads significantly changed the size and importance of Ogden City, as the two companies constructed major railroad facilities and rail yards west of Wall Avenue at the west end of 25th Street. The population rose from 1,463 residents in 1860, to 3,127 residents in 1870, the year after the arrival of the railroad (DUP 1944:98,116; Roylance 1982:420). By 1880 this number had risen to 6,069, and by 1890 it had more than doubled to 12,889 (DUP 1944:116; Peterson and Parson 2001:34, Roberts and Sadler 1985:65). An increase in the number of residents was not the only impact the railroad had on the city's population. Besides increasing its numbers, it increased the population's diversity. Before the arrival of the railroad, most of Ogden City's residents were of northern European descent, primarily British Islanders. After the completion of the railroad, the city's ethnic make up was vastly different. Most of the workers for the various railroads were of Italian, Greek, Chinese, Japanese or African descent (Roberts and Sadler 1985:94-96). Many of these individuals, especially the Chinese workers, chose to remain in Ogden after construction work was completed on the railroad, or while working for the railroad-related industries in town. While most of the Chinese settled in small communities on lower 25th Street and northward, a few lived to the south of that area. The 1890 Sanborn maps of the Ogden area show that a few Chinese immigrants established small vegetable farms on unoccupied plots of land between Young Street (now Grant) and Main Street (now Washington) near Healy Street (Sanborn Map Company 1890).

The arrival of the railroads also affected mining in the state. Prior to 1869, mining activity was limited to small-scale operations where minerals could be reduced to a transportable and cost-efficient size. Before the railroads, the only method of transporting goods or products was by wagon over a relatively long distance and thus expensive. Transporting large quantities of raw or concentrated ores was out of the question. Thus, most mining during this period was limited to precious minerals such as gold and silver, which could be reduced to a transportable size that was economical to transport by wagon (Notarianni 1994:367-368). However, once the railroads extended their tracks into Utah and the mining regions of the state, it became possible to transport large amounts of concentrated ores to processing plants in the east. The number of smelters and mills for producing concentrated ores grew dramatically in areas in and around mining districts, including the Salt Lake Valley. Rail spurs made it possible to move ore to smelters and mills in Midvale and Murray (Notarianni 1994:368). The majority of this ore had to pass through Ogden.

The foundation for business interests was firmly set with the establishment of a number of financial institutions in Ogden. The beginnings of the Utah National Bank, which was organized in 1883 from several other banking institutions, started in 1873. The Deseret National Bank was organized in Salt Lake City in 1872 and opened a branch office in Ogden in 1881. The Ogden First National Bank began operations in 1882, as did the Ogden Savings Bank (Sadler and Roberts 2000:208). The Utah Loan and Trust Company was organized in Ogden in 1888 (Sadler and Roberts 2000:209). The majority of these banking institutions were founded by local businessmen, who had a stake in the success of the businesses of Ogden. This included men such David Eccles, David Perry, Matthew Browning, Franklin S. Richards, and Brigham H. Goddard (Sadler and Roberts 2000:208-209).

In addition, hundreds of travelers per week made their way into or through Ogden via the many passenger trains servicing the town. New businesses, including hotels and restaurants, were established to accommodate these travelers. Among the first hotels to be opened were the Ogden House, at the corner of 24th Street and Washington Boulevard, and the White House (later the Junction House), at the corner of 25th Street and Washington Boulevard (Roberts and Sadler 1985:73). These two establishments were opened in 1868 in anticipation of the railroad's completion. Over the next several years, many other hotels were established including the Union Depot Hotel built in 1869, the Keeney House opened in 1870, and the Beardsley and City Hotels opened in the mid-1870s. Hotel construction continued into the 1880s with the completion of the famous Broom Hotel in 1883 (Roberts and Sadler 1985:73-75).

Ogden was fast becoming more cosmopolitan during this period with the construction of a sewer system in 1879 and other city services and utilities that soon followed (DUP 1944:494-495). The first telephone was installed in the George A. Lowe Company, a wagon and buggy shop, with a number of telephone services in operation by the following year (Sadler and Roberts 2000:126). By 1883 these phone companies were consolidated into the Rocky Mountain Telephone Company (Sadler and Roberts 2000:126). The same year, the Ogden Street Railway Company was organized and incorporated on May 29 as a private street trolley company (DUP 1944:387; Sadler and Roberts 2000:126). Three mule-pulled trolleys began operations on June 2, 1884, and ran "from 28th Street to Ogden River bridge on Washington, and from Washington to the railway depot on 24th and 25th streets" (DUP 1944:387). In addition to a trolley system and telephones, the Ogden Electric Light Company was incorporated on May 11, 1881, and began delivering service to customers in 1884.

Rise of Commercialism (1890 to 1914)

The arrival of the railroads in Ogden had a lasting effect upon the commercial and industrial growth of the area for several decades. An increase in commercial development, warehousing, food processing (canning), and the exportation of local products such as livestock and minerals characterized this period of Ogden's history. During this time, the face of Ogden changed from wooden-frame buildings to brick and mortar structures. Businesses also solidified from temporary commercial enterprises that relied on the initial arrival and construction of the railroads, to trades and industries that invested in the economy and growth of Ogden.

The railroads and the economy, along with the goods and services they produced, continued to grow and expand during this period and as the railroad grew, so did its need for workers. In 1890 the various railroads employed 2,094 workers. By 1890 the number of railroad employees rose to 3,414, and it more than doubled to 8,199 employees in 1900 (Sadler and Roberts 2000:208).

In addition to the railroad, another major industry was livestock. Next to the railroads, the livestock industry became the second leading exporter (Sadler and Roberts 2000:208). Prior to the railroad, the cattle and sheep industry represented small-scale operations that were confined to village and town herds. Cattle ranching, based solely on livestock, existed in Utah during the pre-railroad period (Petersen 1994:333). By the 1880s the number of cattle and sheep began to increase. In 1885 there were approximately 200,000 head of cattle in Utah. Ten years later, the number had risen to 356,000 head. Due to harsh weather that killed a number of animals and poor market prices, the number of cattle remained constant through 1905 (Petersen

1994:333). However between 1905 and 1910, the number began to rise, reaching 412,000 head in 1910 (Petersen 1994:333). Eight years later there were 505,000 head of cattle grazing on grass in Utah. Sheep on the other hand fared better in Utah. In 1885 there were about one million head of sheep. That number grew to 1,500,000 in five years. By 1900 there were approximately 3,818,000 head of sheep, which leveled off to about 2,500,000 by 1915.

While the Utah herds and flocks multiplied, the railroad was shipping animals from the surrounding states including Wyoming, Idaho, and Nevada. The shipment of these animals through Ogden yards soon made Ogden the center of the livestock industry. By 1919, the Ogden Union Stockyards, which was constructed in 1917 and located on the west side of the rail yards, was shipping 3,000 to 7,000 animals per day (Sadler and Roberts 2000:213). As the hub for the industry, Ogden played host to the first Cattleman's Congress in 1892 (Sadler and Roberts 2000:208). In 1918, the Ogden Livestock Show, a weekly livestock auction and competition that drew entries from around the nation, was started at the yards (Roberts and Sadler 1985:140-141). The success of the livestock industry in the area lead to the Ogden Packing and Provision Company establishing operations in 1901, which became the largest meat packing plant west of Omaha (Sadler and Roberts 2000:208). By 1914 a second meat packing company was in operation (Sadler and Roberts 2000:213).

Just as important as the livestock industry was the canning industry, which grew to be one of the largest employers in the Ogden area during this time. Although a few small canning factories had been established in Ogden before the turn of the century, full-scale development of the industry did not begin until the early 1900s. Food canning began in Ogden with the opening of the Colorado-Utah Canning Company in 1886 (Sadler and Roberts 2000:212). After only a year of operations, the owners split and began a separate canning business. In 1890 the Utah Canning Company began by canning *Pierce's Pork and Beans* (Sadler and Roberts 2000:212). In 1904 the company canned 45,000 cases of tomatoes. Between 1890 and 1920, there were 24 food-canning companies (Sadler and Roberts 2000:213). In 1919 there were more than 46 canneries scattered throughout Weber County (Roberts and Sadler 1985:88-89).

Other industries were established in Ogden City around this time, providing jobs to local residents and strengthening the area's economy. Some companies, such as the Sperry Flour Mill, opened after World War I. By 1919 Ogden was one of the ten leading flour milling centers in the United States (Sadler and Roberts 2000:213).

As noted, the original southern boundary of the Ogden town site, as laid out in the early 1850s, was 28th Street (Ogden Historical Society 1938:6). Gradually, in the late 1800s this boundary moved south. The explosive growth of the city's population created the need to expand the boundaries of Ogden City. In 1889, with the population approaching 13,000 residents, the city council moved the southern boundary of Ogden City to 36th Street and the northern boundary 20 blocks to the north (Irene Woodhouse, personal communication 1995; Roberts and Sadler 1985:59). They also moved the eastern boundary of the city to include the land extending to the foothills. At this time, they renamed many city streets.

The expansion of the city caused other changes as well. Around this time, a citywide sewer system was established to help with the growing sanitation problem created by the community's rapid growth. The city's first sewer, a subterranean structure built around 1879, only serviced the area from Washington and 25th Street northward one block and then west to a point below Wall Avenue (DUP 1944:494). In November 1886, a proposal for a citywide sewer was submitted to the City Commissioners by City Engineer Joseph M. Tracy and A. F. Parker, a consulting engineer (DUP 1944:495). It wasn't until sometime in 1888 that funding was obtained for the project and construction work commenced. Public utilities were also beginning to establish themselves. In 1893 the Pioneer Electric Power Company was organized and began construction on a power system that included a temporary dam in Wheeler Canyon, which was finished in 1896 (Sadler and Roberts 2000:211). A permanent dam was constructed across the Ogden River in Ogden Canyon at Pineview. The project was completed in 1897, and the company was sold to the Utah Power and Light Company in August of that same year (Sadler and Roberts 2000:211).

Industrial Development Period (1915 to 1929)

This period is marked by changes in technology that affect the manufacturing industry and the agricultural business. The discovery of new inventions lead to advances in technology that would radically alter both manufacturing, as well as society as a whole. The inventions and scientific discoveries from the last century were slow to develop and have an effect. The most significant of these technological advances was the power generator and the ability to use it to produce large amounts of inexpensive electrical power. This new source of energy allowed manufactures to increase the size of heavy machinery and the assembly line needed to begin to mass produce goods. These goods, which included the automobile, the radio, vacuum cleaner, the washing machine, the electric iron, refrigerator, and other modern conveniences, would change the face of society. This same electricity that was used to power heavy industrial machinery was used in individual households to power appliances that freed the housewife from mundane tasks. This change had been foreshadowed by the canning industry of the last period.

In 1915 the economy in Ogden was still strong with the railroads, livestock trading, food canning and meat packing plants supplying much of the employment. War in Europe had commenced the year before with the assassination of the Austrian Crown Prince Franz Ferdinand at Sarajevo by a Serbian Nationalist. The United States remained neutral during the first part of the war and was able to carry on trade with most other nations including those at war. However, the American public was slowly beginning to side with the Allied Nations of Great Britain, France, Russia, and Belgium. On April 6, 1917, the United States declared war on Germany and her allies after the sinking of the *Lusitania*, which killed a number of American citizens. Many Ogden residents joined the military and served overseas in France and Belgium. During the war, raw materials and food products were badly needed in Europe and on the front. Ogden canneries, meat packing plants, and railroads became busier than ever before. It was important to keep perishable goods cold on their long trips to other processing areas. To meet this need, the railroads constructed an icing plant in Ogden that could produce 400 tons of ice daily and service 272 box cars an hour (Sadler and Roberts 2000:243).

While the United States had enormous resources and manpower at hand, the nations after four years of war were not so fortunate. The First World War came to an end 18 months after the US entered the war on November 11, 1918. Ogden's economy continued to do well following the war; however, it did not last long. By 1920, a down turn in economic conditions reached Ogden and Utah. Wheat prices, which had been $3.50 a bushel in 1918, dropped in 1921 to $0.98 a bushel (Sadler and Roberts 2000:219). In 1919 the shipment of minerals, which had increased 54 percent over the previous years, fell the following year to almost nothing (Sadler and Roberts 2000:219). While mineral and agriculture were slow to rebound, the rest of society had entered the so called "Roaring Twenties" and a period of economic prosperity.

This period of prosperity was made possible through the sales of new products and new marketing techniques, which enticed the consumer to buy higher priced products on the "installment plan" or "easy payment plan" (Allen 1931:140). This plan or program made goods and services more affordable and attractive to the consumer, which spurred the economy during this period. The automobile became the new preferred mode of transportation and helped to stimulate the creation of new industries in the form of tourism, motels, gas stations, repair shops, car show rooms, and fast food stands (Allen 1931:136). Between 1919 and 1929, the number of passenger cars in the United States rose from 6,771,000 to 23,121,000 (Allen 1931:136).

Household electrical appliances also made a major impact upon American culture at the same time, as did the radio. Radio broadcasting in the United States commenced in the fall of 1920 (Allen 1931:137). The radio broadcasts consisted of only music, but by 1922 the new industry was beginning quickly to develop into a medium that would change how society looked at the world (Allen 1931:137). News was added to the schedule of programs, as was radio dramas, comedies, and other entertainment. Advertising also became an important part of the radio broadcasts, sponsoring operas, symphonies, and other programs (Allen 1931:137). The success of radio can be measured in the amount of money spent on radio sets and equipment. Ogden's first radio station, KDZL, was licensed to the Rocky Mountain Radio Corporation and went on the air in June 1922 (Larson and Avery 1994:56). This station was followed by KFCP in February 1923 and over the next two years by KFUR and KFWA (Larson and Avery 1994:56). KFUR, now KLO, was the only one of these stations to survive the Great Depression (Larson and Avery 1994:56).

With the ending of World War I, a major change was made to the Constitution of the United States with the passing of the 18th Amendment. On January 29, 1919, the 18th Amendment to the Constitution was passed and signed into law, which made it illegal to manufacture, sell, or transport alcoholic beverages in the United States (Kelly et al 1991:A28). Although the majority of Americans appear to have backed this law, a good many people opposed it. This prompted many of these individuals to disobey the new law and either smuggle the illegal liquor into the country or manufacture of their own. These activities lead to the operation of underground establishments known as speakeasies. In Ogden a number of speakeasies were located in basements or in "tunnels" that ran beneath the sidewalks of 25th Street (Buchta and Gurrister 2001:1,3A). Twenty-fifth street, which already had a reputation of wild and illegal activity, became worse. Despite the problems that illegal alcohol brought, Prohibition remained in affect until December 5, 1933, when the 21st Amendment was passed that repealed the 18th Amendment, making the manufacturing and sale of liquor legal again (Kelly et al 1991:A30).

Ogden grew with the prosperity that the nation enjoyed. The population in the city grew from 33,804 people in 1920 to 40,272 people in 1930 (Powell 1994:437). The businesses along 25th Street do not appear to have changed much physically during this period. The majority of changes appears to be the expansion of businesses along Washington Avenue. The success and prosperity of these businesses are visible in the larger and taller business buildings of the period. The new larger structures contained office space rather than space for manufacturing, which was now taking place farther from the center of town. The business district, which had been growing throughout the earlier periods, was now at "build out" with the center located at 25th and Washington. The financial heart was along Washington while the night life was located along 25th Street.

The Depression Era (1930 to 1941)

The impact of the stock market crash on the economy of Ogden City marks this period. The loss of jobs, the closures of many businesses, and a sharp decline in expansion are the hallmarks of the period. This era is also characterized by the construction of several new buildings. This construction was the result of government-sponsored public works projects designed to provide some fiscal relief from the vagaries of the Great Depression. Besides the Railroad Era, the period of largest growth for Ogden and adjacent municipalities was during the 1920s and, especially, the 1930s. Though economic problems occurred in Ogden during this period because of the Great Depression, it was also a time of expansion for the community.

The stock market crash of October 29, 1929, brought a rapid halt to the benefits of a strong agricultural and industrial economy being enjoyed by Ogdenites at the end of the 1920s. As a whole, Utah was one of the states most affected by the Great Depression. By 1933, Utah's unemployment rate soared to 35.8 percent, fourth highest in the nation (McCormick 1995:136). Roughly 32 percent of the state's population was receiving part or all of their resources from government relief funds, and 32 of the state's 105 banks had failed, including the Ogden State and Pingree National banks (Roberts and Sadler 1985:121-125).

At the time of the Great Depression, the economy of Ogden City was largely dependent on the agriculture (livestock and canning included) and railroad industries. As the value of agricultural products plunged, residents began to suffer hardships. The railroad companies could no longer afford to ship locally produced goods to outside markets. As a result, not only did the farmers, ranchers, and cannery workers have no outlet for their products, but also the railroad companies began laying off their own workers. Several canning factories and many other local business, closed down during the Depression. Some reopened during or after World War II, but many others never did.

In an attempt to boost the economy by providing employment to local residents, many agencies, both private charity and government sponsored, developed public works projects in the mid 1930s. Federal programs such as the Civilian Conservation Corps (CCC), the Federal Emergency Relief Administration (FERA), the National Youth Administration (NYA), the Public Works Administration (PWA), and the Works Progress Administration (WPA) provided employment and assistance to Ogdenites. Through the CCC, they constructed recreational campsites and new roads in Ogden Canyon and up to Monte Cristo, and they established the Ogden Bird Refuge (Roberts and Sadler 1985:126). However, it was the PWA that had perhaps the greatest impact on the Ogden area. During their employment with the PWA, local workers constructed the U.S. Forest Service building at 25th Street and Adams Avenue, the Ogden City Municipal Building at 25th Street and Washington Boulevard, and Ogden High School just north of 30th Street on Harrison Boulevard. Relief programs such as these helped Ogdenites through the Great Depression until the activities of World War II provided a permanent economic recovery.

World War II (1942 to 1947)

The establishment of several government installations marks this period in and around the Ogden area in preparation for World War II and by the war years themselves. The establishment of these facilities provided new jobs for thousands of Ogdenites left unemployed by the Great Depression. During this time, the number of new houses in the area increased as employment opportunities arose.

As tension overseas began to grow, the United States began to prepare for what would be an inevitable result, war. While war is not a fortunate event, the coming of World War II did serve to pull the nation and Ogden City out of the stranglehold of the Great Depression. In preparation for the war, several new military installations were built or expanded in the Ogden area during this time, including the Utah General Depot (later the Defense Depot Ogden), the Ogden Arsenal (originally built in 1920), and Hill Material Air Base (now Hill Air Force Base).

Although in north Davis County, Hill Material Air Base became one of the largest employers for Ogdenites both during and after its construction. Opened in 1939, the WPA constructed the base (Roberts and Sadler 1985:130). By 1943, the base employed roughly 22,000 people, many of them women, doing sheet metal work, welding, or aircraft repair.

Located west of Wall Avenue and north of 12th Street, the Utah General Depot was opened as a military warehousing facility in 1940 (Roberts and Sadler 1985:130). The depot eventually became the largest quartermasters' depot in the United States. By 1943, more than 7,700 local civilian personnel were employed at the facility.

International Period (1948 to 1960)

Initial rapid residential growth in Ogden marks the postwar period, followed by a slow decline within the current project area. Government-related or government-run facilities remain among the area's largest employers.

Federal employment continued to play an important role in the economy of the Ogden area throughout the mid-1950s. The establishment of an IRS district office, the Western Internal Revenue Center, at the Defense Depot in late 1956 provided jobs for more than 360 local residents. By 1970, the workload of the center had outgrown the confines of that building at the Depot. A new building complex was constructed to the west of the old one (at 12th West and 12th South), and housed nearly 4,000 workers. Rapid growth in both the residential and commercial sectors has marked the Post-War period in Ogden, as a whole. As major industries, such as Thiokol Corporation (manufacturer of rocket motors), Kimberly-Clark, Iomega, and Morton International continue to locate in or near Ogden, the area attracts more residents.

Ogden's population increase can be seen in the creation of new subdivisions throughout the city. However, within the current project area, only one subdivision, the Crouch Subdivision (started in 1957), can be definitively attributed to the Post-War Period (Weber County Recorder n.d.). In fact, very little growth has occurred within the current project area since the close of World War II, and, to some extent, the neighborhoods within this area have been in decline. While new subdivisions are being created in vacant areas of the east bench and in surrounding suburbs and communities, Wall Avenue from 26th to 36th is gradually being taken over by industrial and commercial development, as well as car dealerships.

METHODOLOGY

An intensive cultural resource inventory was carried out for the landfill near Little Mountain. The project area was inventoried in parallel transects spaced no more than 15 meters apart to cover a total of 112 acres of private land. The boundaries of the survey area were established using a differentially correctable trimble GeoXT device in combination with existing landmarks and aerial photographs.

RESULTS

A cultural resource inventory was carried out for a portion of Little Mountain Landfill. The inventory resulted in the identification of one historic campsite, 42WB445, and one rock quarry, 42WB446 (Figure 2). Due to their proximity to the Lucin Cutoff, as well as datable artifacts found at the campsite, it is highly likely that these two sites are related to the construction of the cutoff. Site 42WB445 is an historic campsite with eight depressions (F1 through F8) and a surficial scatter of aqua and amethyst glass, porcelain, brick fragments, and tin can fragments. Site 42WB446 is an abandoned rock quarry that has filled with water.

Site 42WB445

This site is located on a 1 to 2 degree slope on the southeast side of Little Mountain. The site consists of a historic campsite including eight depressions (F1-8), most likely dugout structures for a railroad construction camp. The depressions are located on top of a ridge with a sharp 30 to 40 ft drop off to the south. The possible dugouts vary in size from 16 by 12 ft and 5 by 6 ft and were all dug back into the low south-facing slope. Depressions 1 and 2 have rocks and boulders reinforcing the downslope berm. There is no apparent pattern to these rocks. Depressions 3-7 are located south of Depression 1 and 2 and are constructed adjacent to one another on the edge of the steep drop off. Each of these five dugouts shares a berm wall with the next dugout. These berms measure 9 to 15 ft wide. Depression 8 is a shallow depression measuring 14 by 14 ft with what appears to be an entryway on the southeast side. Dugouts range in depth between 8 in and 2 ft. Historic artifacts were observed sparsely scattered throughout the site and include aqua and amethyst glass, porcelain fragments, firebrick fragments, metal fragments, a single fragment of opalized clear glass, a few small pieces of cut bone, and numerous fragments of deteriorated tin cans. A modern fenceline and road run in an east-west direction, just north of the site and may have destroyed additional features or artifacts; however, no evidence of this is currently visible. Additionally, the site has been impacted by modern recreational use evidenced by shotgun shells and modern trash.

It appears that these features and artifacts are part of a railroad construction camp related to construction of the Lucin Cutoff ca. 1902-1904, for the Southern Pacific Transportation Company's mainline from Ogden to San Francisco. The Lucin Cutoff, constructed largely by the Utah Construction Company, began in 1902 and worker campsites and a shipyard were known to have been located in the Little Mountain area (Peterson 2001:48-59). When the Lucin Cutoff was constructed across Great Salt Lake, the original transcontinental railroad route around Promontory Summit was abandoned as the main line. The historic trestle carried trains across the lake into the early 1960s when the modern earthen dike that is still in use today replaced it.

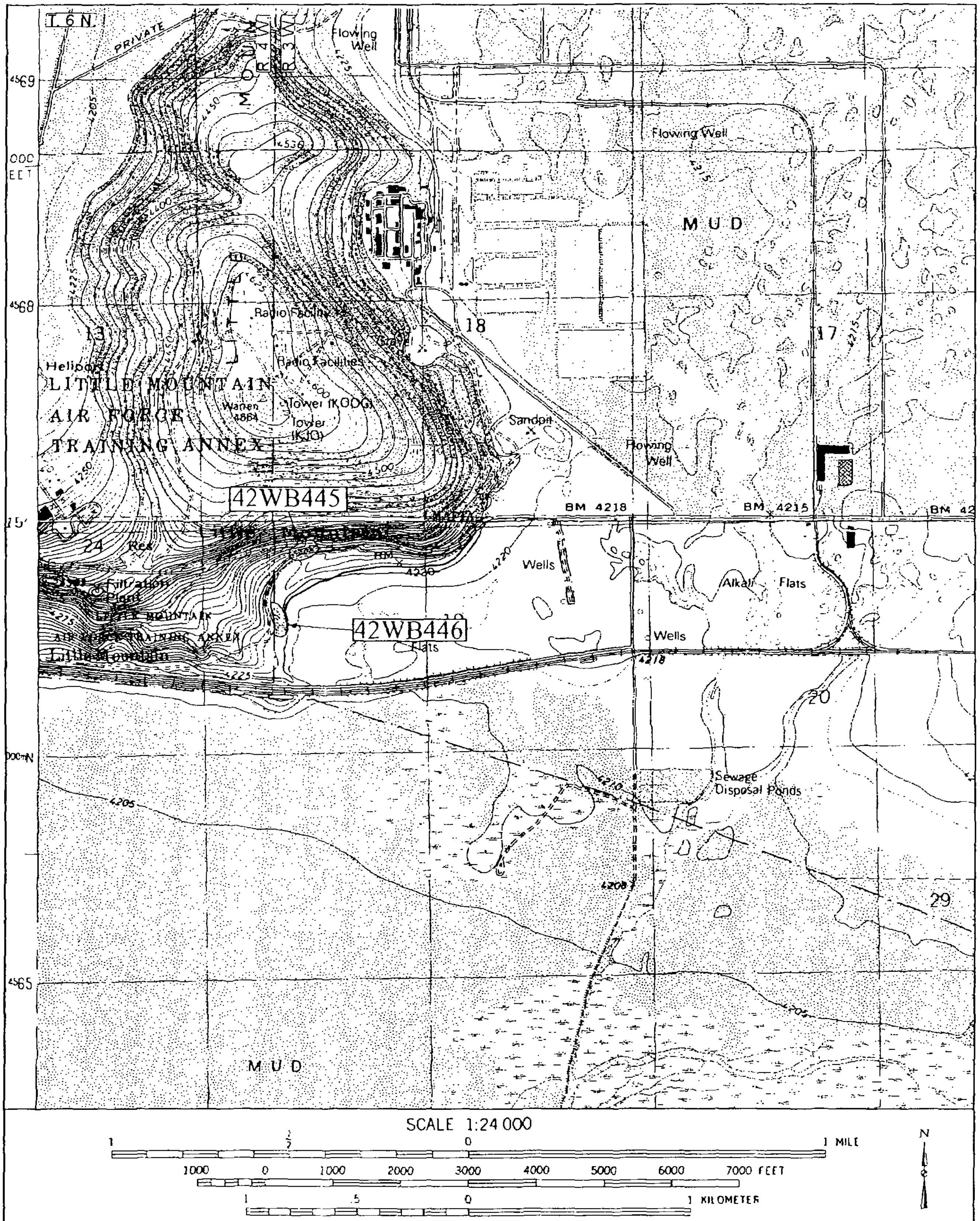

Figure 2. Location of sites 42WB445 and 42WB446, identified during the survey. Taken from USGS 7.5' Quadrangles Plain City SW, Utah (1991) and Ogden Bay, Utah (1991).

Site 42WB446

This site, located on the southeast base of Little Mountain, is an abandoned materials quarry. The site is likely associated with the construction of the Lucin Cutoff, ca. 1902-1904, a railroad that spanned the Great Salt Lake. According to historic records, stone and fill from Little Mountain provided material for the railroad grade and accompanying dike (Peterson 2001:48-59). The quarry and its associated access road are currently abandoned, as indicated by vegetation overgrowth and stagnant water pooling in the quarry. Artifacts associated with this site include a surficial scatter of aqua and brown bottle glass fragments, deteriorated tin can fragments, and modern trash. No additional artifacts or features were noted at this site.

RECOMMENDATIONS

An intensive cultural resource inventory was carried out for the Little Mountain Landfill. Two new cultural resource sites (42WB445 and 42WB446) were located during this inventory. Following are the criteria followed in determining the eligibility of properties as set forth in 36CFR 60.4:

> The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:
>
> (A) that are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> (B) that are associated with the lives of persons significant in our past; or
>
> (C) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
>
> (D) that have yielded, or may be likely to yield, information important in prehistory or history.

Site 42WB445

This site is associated with the Lucin Cutoff constructed across Great Salt Lake between 1902-1904, a significant event in the history of railroads in the United States. Campsites such as this are expected along historic railroads as a result of the large workforce required for construction. Although the site is disturbed, subsurface features may be present and have the potential to provide further information in the understanding of worker construction camps along the Lucin Cutoff. Additionally, the Lucin Cutoff construction and related sites are associated with events (transcontinental transportation) that have made a significant contribution to the broad patterns of history. As such, the site is recommended eligible to the NRHP under criteria A and D.

Site 42WB446

This site is associated with the Lucin Cutoff constructed across Great Salt Lake between 1902-1904, a significant event in the history of railroads in the United States. Quarries, such as this, are expected near the Lucin Cutoff since fill was required to complete the railroad through this area. Additionally, the Lucin Cutoff construction and related sites are associated with events (transcontinental transportation) that have made a significant contribution to the broad patterns of history. As such, the site is recommended eligible to the NRHP under criteria A.

The railroad construction camp (42WB445) and the railroad quarry (42WB446) have been recommended eligible to the NRHP. Both sites are located on the northwestern periphery of the project area, and can easily be avoided by landfill activities. Sagebrush recommends that these sites be avoided during construction and use of the landfill area.

This investigation was conducted with techniques that are considered to be adequate for evaluating cultural resources that are available for visual inspection and could be adversely affected by the proposed project. Based on the above-mentioned avoidance, cultural resource clearance is recommended for the current project. However, should such resources be discovered during construction, a report should be made immediately to the State Archaeologist at the Utah State Historic Preservation Office, Salt Lake City, Utah.

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EXHIBIT D

Property Owner Notification Letters

WEBER COUNTY

WASTE DISPOSAL DIVISION

Gary Laird
Director

Kellie Cragun
Office Manager

January 15, 2009

Counterpoint Construction Company, Inc.
1598 North Hill Fill Road Ste. A
Layton, Utah 84041

Re: Weber County Construction and Demolition Landfill Permit

To Whom it May Concern:

Notice is hereby given that Weber County intends to apply with the Utah Division of Solid and Hazardous Waste for a permit to own and operate a Class Ivb Landfill Facility within the northwest 1/4 of Section 19, Township 6 north, Range 3 West, Salt Lake Base & Meridian. The property is located within unincorporated Weber County Utah approximately 10 miles west of Marriott-Slaterville along highway 39 (turns into 900 South) as shown in the attached figure.

The Utah Division of Solid and Hazardous Waste may be contacted to review and comment on the permit application.

Sincerely,

Gary C. Laird
Weber County Director of Solid Waste

867 West Wilson Lane
Ogden, Utah 84401
Administration: (801) 399-8806
Disposal Operations: (801) 399-8538
FAX (801) 399-8807

WEBER COUNTY

WASTE DISPOSAL DIVISION

Gary Laird
Director

Kellie Cragun
Office Manager

Scott Walker, Habitat Manager
Division of Wildlife Resources
515 East 5300 South
Ogden, Utah 84405

January 15, 2009

Re: Weber County Construction and Demolition Landfill Permit

Dear Mr. Walker:

Notice is hereby given that Weber County intends to apply with the Utah Division of Solid and Hazardous Waste for a permit to own and operate a Class IVb Landfill Facility within the northwest ¼ of Section 19, Township 6 North, Range 3 West, Salt Lake Base & Meridian. The property is located within unincorporated Weber County Utah approximately 10 miles west of Marriott-Slaterville along highway 39 (turns into 900 South) at 10485 West 900 South as shown in the attached figure.

The Utah Division of Solid and Hazardous Waste may be contacted to review and comment on the permit application.

Sincerely,

Gary C. Laird
Weber County Director of Solid Waste

867 West Wilson Lane
Ogden, Utah 84401
Administration: (801) 399-8806
Disposal Operations: (801) 399-8538
FAX (801) 399-8807

WEBER COUNTY

WASTE DISPOSAL DIVISION

Gary Laird
Director

Kellie Cragun
Office Manager

Westinghouse Electric Company LLC
1330 Beulah Road
Pittsburg, Pennsylvania 15235

January 15, 2009

Re: Weber County Construction and Demolition Landfill Permit

To Whom It May Concern:

Notice is hereby given that Weber County intends to apply with the Utah Division of Solid and Hazardous Waste for a permit to own and operate a Class IVb Landfill Facility within the northwest ¼ of Section 19, Township 6 North, Range 3 West, Salt Lake Base & Meridian. The property is located within unincorporated Weber County Utah approximately 10 miles west of Marriott-Slaterville along highway 39 (turns into 900 South) at 10485 West 900 South as shown in the attached figure.

The Utah Division of Solid and Hazardous Waste may be contacted to review and comment on the permit application.

Sincerely,

Gary C. Laird
Gary C. Laird
Weber County Director of Solid Waste

867 West Wilson Lane
Ogden, Utah 84401
Administration: (801) 399-8806
Disposal Operations: (801) 399-8538
FAX (801) 399-8807

WEBER COUNTY

WASTE DISPOSAL DIVISION

Gary Laird
Director

Kellie Cragun
Office Manager

January 15, 2009

Tim Stone, AICP
Hill Air Force Base Community Planner
75 CEG/CEPP
7302 Wardleigh Road
Hill AFB, Utah 84056-5016

Re: Weber County Construction and Demolition Landfill Permit

Dear Mr. Stone:

Notice is hereby given that Weber County intends to apply with the Utah Division of Solid and Hazardous Waste for a permit to own and operate a Class IVb Landfill Facility within the northwest ¼ of Section 19, Township 6 North, Range 3 West, Salt Lake Base & Meridian. The property is located within unincorporated Weber County Utah approximately 10 miles west of Marriott-Slaterville along highway 39 (turns into 900 South) at 10485 West 900 South as shown in the attached figure.

The Utah Division of Solid and Hazardous Waste may be contacted to review and comment on the permit application.

Sincerely,

Gary C. Laird
Weber County Director of Solid Waste

867 West Wilson Lane
Ogden, Utah 84401
Administration: (801) 399-8806
Disposal Operations: (801) 399-8538
FAX (801) 399-8807

WEBER COUNTY

WASTE DISPOSAL DIVISION

Gary Laird
Director

Kellie Cragun
Office Manager

Union Pacific Railroad
1400 Douglas Street
Omaha, Nebraska 68179

January 15, 2009

Re: Weber County Construction and Demolition Landfill Permit

To Whom It May Concern:

Notice is hereby given that Weber County intends to apply with the Utah Division of Solid and Hazardous Waste for a permit to own and operate a Class IVb Landfill Facility within the northwest ¼ of Section 19, Township 6 North, Range 3 West, Salt Lake Base & Meridian. The property is located within unincorporated Weber County Utah approximately 10 miles west of Marriott-Slaterville along highway 39 (turns into 900 South) at 10485 West 900 South as shown in the attached figure.

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WEBER COUNTY

WASTE DISPOSAL DIVISION

Gary Laird
Director

Kellie Cragun
Office Manager

Powder Mountain Group Holdings LLC
57 West 200 South
Salt Lake City, Utah 84111

January 15, 2009

Re: Weber County Construction and Demolition Landfill Permit

To Whom It May Concern:

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Weber County Director of Solid Waste

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Disposal Operations: (801) 399-8538
FAX (801) 399-8807

WEBER COUNTY

WASTE DISPOSAL DIVISION

Gary Laird
Director

Kellie Cragun
Office Manager

January 15, 2009

Joseph M. Colosimo
367 E 11800 S
Draper, Utah 84094

Re: Weber County Construction and Demolition Landfill Permit

Dear Property Owner:

Notice is hereby given that Weber County intends to apply with the Utah Division of Solid and Hazardous Waste for a permit to own and operate a Class IVb Landfill Facility within the northwest ¼ of Section 19, Township 6 North, Range 3 West, Salt Lake Base & Meridian. The property is located within unincorporated Weber County Utah approximately 10 miles west of Marriott-Slaterville along highway 39 (turns into 900 South) at 10485 West 900 South as shown in the attached figure.

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Sincerely,

Gary C. Laird
Weber County Director of Solid Waste

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Ogden, Utah 84401
Administration: (801) 399-8806
Disposal Operations: (801) 399-8538
FAX (801) 399-8807

WEBER COUNTY

WASTE DISPOSAL DIVISION

Gary Laird
Director

Kellie Cragun
Office Manager

Bible Broadcasting Network, Inc.
8030 Arrowridge Blvd
Charlotte, North Carolina 28273

January 15, 2009

Re: Weber County Construction and Demolition Landfill Permit

Dear Property Owner:

Notice is hereby given that Weber County intends to apply with the Utah Division of Solid and Hazardous Waste for a permit to own and operate a Class IVb Landfill Facility within the northwest ¼ of Section 19, Township 6 North, Range 3 West, Salt Lake Base & Meridian. The property is located within unincorporated Weber County Utah approximately 10 miles west of Marriott-Slaterville along highway 39 (turns into 900 South) at 10485 West 900 South as shown in the attached figure.

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Sincerely,

Gary C. Laird
Weber County Director of Solid Waste

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Ogden, Utah 84401
Administration: (801) 399-8806
Disposal Operations: (801) 399-8538
FAX (801) 399-8807

WEBER COUNTY

WASTE DISPOSAL DIVISION

Gary Laird
Director

Kellie Cragun
Office Manager

January 15, 2009

Utah Department of Transportation
4501 South 2700 West
Mail Stop 141200
Salt Lake City, Utah 84114-1200

Re: Weber County Construction and Demolition Landfill Permit

To Whom It May Concern:

Notice is hereby given that Weber County intends to apply with the Utah Division of Solid and Hazardous Waste for a permit to own and operate a Class IVb Landfill Facility within the northwest ¼ of Section 19, Township 6 North, Range 3 West, Salt Lake Base & Meridian. The property is located within unincorporated Weber County Utah approximately 10 miles west of Marriott-Slaterville along highway 39 (turns into 900 South) at 10485 West 900 South as shown in the attached figure.

The Utah Division of Solid and Hazardous Waste may be contacted to review and comment on the permit application.

Sincerely,

Gary C. Laird
Weber County Director of Solid Waste

867 West Wilson Lane
Ogden, Utah 84401
Administration: (801) 399-8806
Disposal Operations: (801) 399-8538
FAX (801) 399-8807

7008 1830 0002 4578 4650

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OFFICIAL USE — HILL AFB UT 84056

Postage	$ $0.42	0221
Certified Fee	$2.70	14
Return Receipt Fee (Endorsement Required)	$0.00	Postmark Here
Restricted Delivery Fee (Endorsement Required)	$0.00	
Total Postage & Fees	$ $3.12	01/21/2009

POST OFFICE OGDEN UT 84401 JAN 21 2009

Sent To Tim Stone HAFB Base Community
Street, Apt. No.; or PO Box No. 75 CEG CEPP 7302 Wardleigh Rd
City, State, ZIP+4 HAFB UT 84056-5016

PS Form 3800, August 2006 — See Reverse for Instructions

7008 1830 0002 4578 4643

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OFFICIAL USE — OMAHA NE 68179

Postage	$ $0.42	0221
Certified Fee	$2.70	14
Return Receipt Fee (Endorsement Required)	$0.00	Postmark Here
Restricted Delivery Fee (Endorsement Required)	$0.00	
Total Postage & Fees	$ $3.12	01/21/2009

POST OFFICE OGDEN UT 84401 JAN 21 2009

Sent To Union Pacific Railroad
Street, Apt. No.; or PO Box No. 1400 Douglas St.
City, State, ZIP+4 Omaha NE 68179

PS Form 3800, August 2006 — See Reverse for Instructions

7008 1830 0002 4578 4605

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OFFICIAL USE — OGDEN UT 84414

Postage	$ $0.42	0221
Certified Fee	$2.70	14
Return Receipt Fee (Endorsement Required)	$0.00	Postmark Here
Restricted Delivery Fee (Endorsement Required)	$0.00	
Total Postage & Fees	$ $3.12	01/21/2009

POST OFFICE OGDEN UT 84401 JAN 21 2009

Sent To UT Dept Transportation
Street, Apt. No.; or PO Box No. 4501 S. 2700 W. Mailstop 141200
City, State, ZIP+4 SLC Utah 84414-1200

PS Form 3800, August 2006 — See Reverse for Instructions

7008 1830 0002 4578 4629

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For delivery information visit our website at www.usps.com®

OFFICIAL USE — SANDY UT 84094

Postage	$ $0.42	0221
Certified Fee	$2.70	14
Return Receipt Fee (Endorsement Required)	$0.00	Postmark Here
Restricted Delivery Fee (Endorsement Required)	$0.00	
Total Postage & Fees	$ $3.12	01/21/2009

OGDEN UT 84401 JAN 21 2009

Sent To Joseph M. Colosimo
Street, Apt. No.; or PO Box No. 367 E. 11800 S
City, State, ZIP+4 Draper UT 84094

PS Form 3800, August 2006 — See Reverse for Instructions

7008 1830 0002 4578 4636

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OFFICIAL USE — SALT LAKE CITY UT 84111

Postage	$ $0.42	0221
Certified Fee	$2.70	14
Return Receipt Fee (Endorsement Required)	$0.00	Postmark Here
Restricted Delivery Fee (Endorsement Required)	$0.00	
Total Postage & Fees	$ $3.12	01/21/2009

POST OFFICE OGDEN UT 84401 JAN 21 2009

Sent To Powder Mtn Group Holdings LLC
Street, Apt. No.; or PO Box No. 57 W. 200 S.
City, State, ZIP+4 SLC UT 84111

PS Form 3800, August 2006 — See Reverse for Instructions

7008 1830 0002 4578 4612

U.S. Postal Service™ CERTIFIED MAIL™ RECEIPT
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For delivery information visit our website at www.usps.com®

OFFICIAL USE — CHARLOTTE NC 28273

Postage	$ $0.42	0221
Certified Fee	$2.70	14
Return Receipt Fee (Endorsement Required)	$0.00	Postmark Here
Restricted Delivery Fee (Endorsement Required)	$0.00	
Total Postage & Fees	$ $3.12	01/21/2009

POST OFFICE OGDEN UT 84401 JAN 21 2009

Sent To Bible Broadcasting Network Inc
Street, Apt. No.; or PO Box No. 8030 Arrowridge Blvd
City, State, ZIP+4 Charlotte NC 28273

PS Form 3800, August 2006 — See Reverse for Instructions

7008 1830 0002 4578 4674

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For delivery information visit our website at www.usps.com®

OGDEN UT 84405 OFFICIAL USE

Postage	$	$0.42
Certified Fee		$2.70
Return Receipt Fee (Endorsement Required)		$0.00
Restricted Delivery Fee (Endorsement Required)		$0.00
Total Postage & Fees	$	$3.12

0221
14
Postmark Here
MAIN POST OFFICE OGDEN UT
JAN 21 2009
01/21/2009

Sent To Scott Walker Habitat Mg.
Street, Apt. No.; or PO Box No. 515 E. 5300 S. Div. Wildlife
City, State, ZIP+4 Ogden UT 84405

PS Form 3800, August 2006 See Reverse for Instructions

7008 1830 0002 4578 4667

U.S. Postal Service™
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For delivery information visit our website at www.usps.com®

PITTSBURGH PA 15235 OFFICIAL USE

Postage	$	$0.42
Certified Fee		$2.70
Return Receipt Fee (Endorsement Required)		$0.00
Restricted Delivery Fee (Endorsement Required)		$0.00
Total Postage & Fees	$	$3.12

0221
14
Postmark Here
OFFICE OGDEN
JAN 21 2009
01/21/2009

Sent To Westinghouse Electric
Street, Apt. No.; or PO Box No. 1330 Beulah Rd
City, State, ZIP+4 Pittsburg PA 15235

PS Form 3800, August 2006 See Reverse for Instructions

7008 1830 0002 4578 4681

U.S. Postal Service™
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For delivery information visit our website at www.usps.com®

LAYTON UT 84041 OFFICIAL USE

Postage	$	$0.42
Certified Fee		$2.70
Return Receipt Fee (Endorsement Required)		$0.00
Restricted Delivery Fee (Endorsement Required)		$0.00
Total Postage & Fees	$	$3.12

0221
14
Postmark Here
MAIN POST OFFICE OGDEN UT
JAN 21 2009
01/21/2009

Sent To Counterpoint Const. Co.
Street, Apt. No.; or PO Box No. 1598 N. Hill Field Rd Ste A
City, State, ZIP+4 Layton, UT. 84041

PS Form 3800, August 2006 See Reverse for Instructions

EXHIBIT E

U. S. Army Corps of Engineers Wetlands Determination Documents

38813

HAND DELIVERED

MAR 23 2009

UTAH DIVISION OF
SOLID & HAZARDOUS WASTE

2009.01043

DEPARTMENT OF THE ARMY
SACRAMENTO DISTRICT, CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO CA 95814-2922

REPLY TO
ATTENTION OF

March 18, 2009

Regulatory Division (SPK-2008-867)

RECEIVED
MAR 23 2009
H A & L

Randy Moulding
Moulding and Sons Sand and Gravel
910 West 21st Street
Ogden, Utah 84401-5600

Dear Mr. Moulding:

We are responding to your consultant's request for an approved jurisdictional determination for the Little Mountain Property. This approximately 114-acre site is located in Section 19, Township 6 North, Range 3 West, Salt Lake Base and Meridian, centered on Latitude 41.24775 North, Longitude 112.222788 West, west of Ogden, Weber County, Utah.

The 114-acre site has approximately 31.73 acres of wetlands as depicted on the enclosed Figure 2 of the *Moulding & Son's Little Mountain Property Wetland Delineation Report* prepared by Paul West. These wetlands are intrastate isolated wetlands with no apparent interstate or foreign commerce connection or any connection to any other regulated water of the United States. As such, waters on this site are not currently regulated by the Corps of Engineers. This disclaimer of jurisdiction is only for Section 404 of the Federal Clean Water Act. Other Federal, State, and local laws may apply to your activities.

This verification is valid for five years from the date of this letter, unless new information warrants revision of the determination before the expiration date. This letter contains an approved jurisdictional determination for your subject site. If you object to this determination, you may request an administrative appeal under Corps regulations at 33 CFR Part 331.

A combined Notification of Appeal Process fact sheet and Request for Appeal form is enclosed. If you request to appeal this determination you must submit a completed Request For Appeal form to the South Pacific Division Office at the following address: Administrative Appeal Review Officer, Army Corps of Engineers, South Pacific Division, CESPD-PDS-O, 1455 Market Street, San Francisco, California 94103-1399, Telephone: 415-503-6574, FAX: 415-503-6646.

In order for an appeal request to be accepted by the Corps, the Corps must determine that it is complete, that it meets the criteria for appeal under 33 CFR Part 331.5, and that it has been received by the Division Office within 60 days of the date of the Notification of Appeal Process fact sheet. Should you decide to submit a Request for Appeal form, it must be received at the above address by 60 days from the date of this letter. It is not necessary to submit an appeal request form to the Division Office if you do not object to the determination in this letter.

You should provide a copy of this letter and notice to all other affected parties, including any individual who has an identifiable and substantial legal interest in the property.

This determination has been conducted to identify the limits of Corps of Engineers' Clean Water Act jurisdiction for the particular site identified in this request. This determination may not be valid for the wetland conservation provisions of the Food Security Act of 1985. If you or your tenant are USDA program participants, or anticipate participation in USDA programs, you should request a certified wetland determination from the local office of the Natural Resources Conservation Service, prior to starting work.

We appreciate your feedback. At your earliest convenience, please complete our customer survey at *http://www.spk.usace.army.mil/customer_survey.html.* Your passcode is "conigliaro."

If you have any questions, please contact Richard Gebhart, Bountiful Regulatory Office, 533 W 2600 South, Suite 150, Bountiful, Utah 84010-7714; email richard.a.gebhart@usace.army.mil; or telephone 801-295-8380 x16.

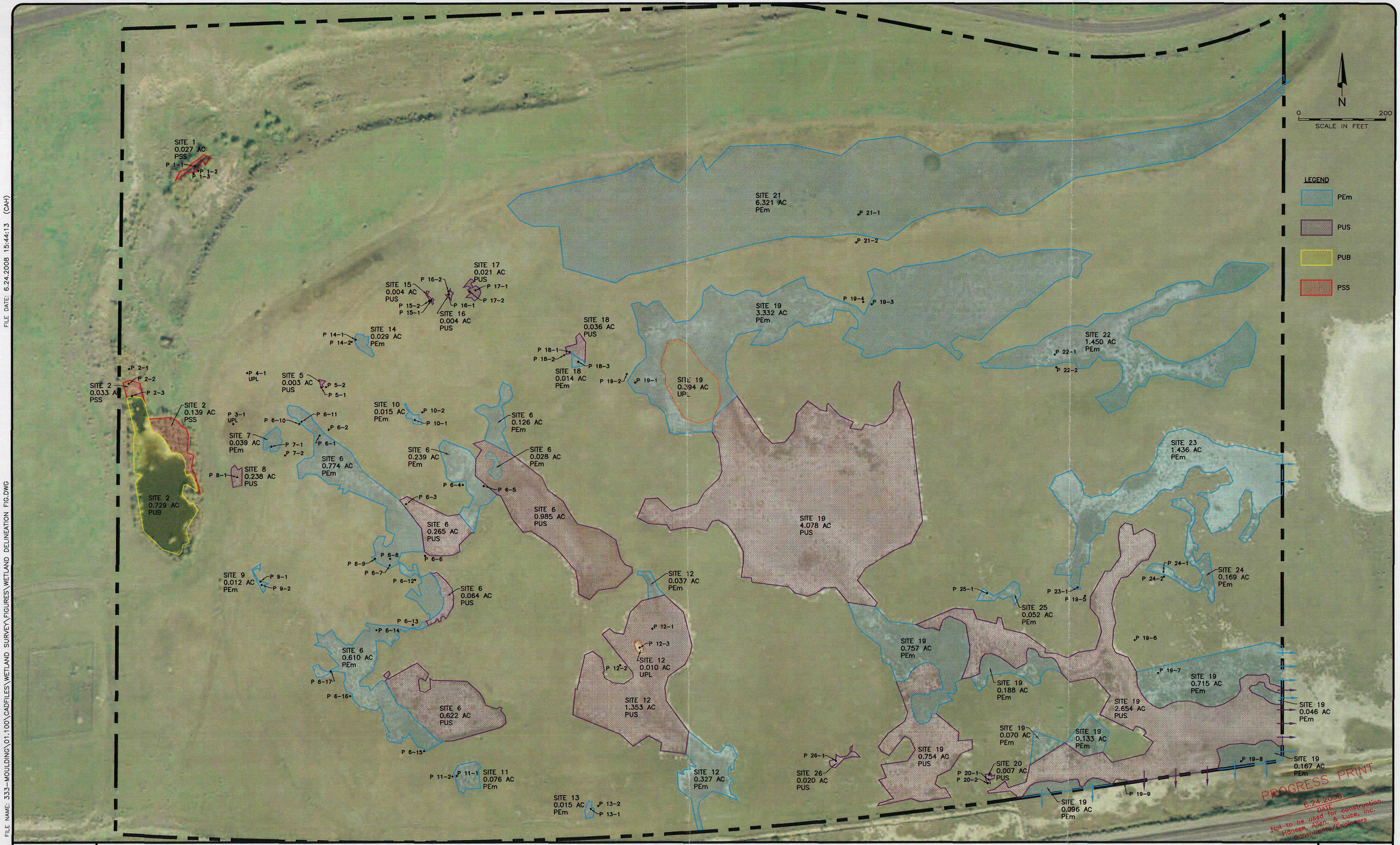
Sincerely,

Jason Gipson
Chief, Nevada-Utah Branch

Enclosure

Copy Furnished with Enclosure

Gordon Jones, Hansen, Allen, and Luce, Inc., 6771 S. 900 East, Salt Lake City UT 84047-1436
Paul West, 2478 W. Long Meadow Dr, West Jordan UT 84084-5805



FILE NAME: 333-MOULDING\01.100\CADFILES\WETLAND SURVEY\FIGURES\WETLAND DELINEATION FIG.DWG   FILE DATE: 6.24.2008 15:44:13 (CAH)

HANSEN ALLEN & LUCE INC ENGINEERS

10/07

WETLAND DELINEATION

FIGURE 1

HAND DELIVERED

MAR 2 5 2009

UTAH DIVISION OF
SOLID & HAZARDOUS WASTE

HANSEN ALLEN & LUCE inc
ENGINEERS

SALT LAKE AREA OFFICE
6771 SOUTH 900 EAST
MIDVALE, UTAH 84047
PHONE: (801) 566-5599
FAX: (801) 566-5581
www.hansenallenluce.com

Utah Department of Environmental Quality
Division of Solid and Hazardous Waste
288 North 1460 West
P.O. Box 144880
Salt Lake City, Utah 84114-4880

March 23, 2009

RE: Weber County C&D Landfill Permit Application
Comments regarding Wetland Definitions and Issues

Gentlemen:

A wetland delineation was completed by a wetland biologist (between mid April and mid May 2008) on the property proposed for the Weber County C&D landfill located immediately south of Little Mountain in Weber County, in the Northwest Quarter, Section 19, Township 6 North, Range 3 West, Salt Lake Base and Meridian. Information from the wetland delineation work was subsequently submitted to the Army Corps of Engineers to determine whether or not the delineated sites on the property are regulated under Section 404 of the Clean Water Act.

A letter from the Corps of Engineers dated March 18, 2009 is provided Exhibit E of the permit application determining the wetlands delineated on the property as non-jurisdictional, or otherwise, not regulated by the Corps of Engineers under Section 404 of the Federal Clean Water Act. Concurrence to the Corps of Engineers determination was provided by the U.S. EPA prior to receiving their letter. A figure prepared by a wetland biologist was included with the letter from the Corps of Engineers that delineated wetlands on the property based on the broad definitions outlined by the Corps of Engineers. Non-regulated areas under Section 404 do not require any permits, alternatives analyses, or mitigation measures for removal and development.

The Utah Administrative Code provides the definition of wetlands (R315-301-2(86) as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal conditions do support, a prevalence of vegetation typically *adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs,* and similar areas." None of the areas delineated on the property meet the definition of a wetland provided in the Utah Administrative Code as is demonstrated in the following paragraphs.

None of the areas delineated on the figure contain inundated or saturated conditions from surface or ground water except for the excavated area associated with a prior gravel pit operations located at the west side of the property, one location (19-8) at the extreme southeast corner of the property which is outside the landfill footprint, and another location (21-1) just south of the facility access and operations area. The south end of the west side of the gravel pit receives surface water runoff from little mountain resulting from precipitation and snow melt events. This water is lost to evaporation, transpiration, and percolation into the soils and dries up sometime during the summer. The pond has been used as a water source for stock watering of cattle on the property, but has not supported life that typically exists in saturated conditions. Since the gravel pit area does not support life that typically exists in saturated conditions, it does not meet the definition of a wetland in the administrative code and will become permanently dry when storm water controls are implemented. These storm water controls include diverting runoff from Little Mountain toward the east along the south side of the existing road and then south through a series of detention ponds along the east property line. The other two locations showed very small areas of saturated soils at the time of the delineation (April-May) which was during a time when the site received several storm events. These areas, however, dried to non-saturated conditions within weeks of the delineation and are also not known to support life that typically exists in saturated conditions.

The other areas delineated as being wetlands on the figure are primarily associated with playas sites typically consisting of bare soils with high salt content. These areas are not inundated, do not consist of saturated soils, most do not support vegetative growth, and they do not support life that typically exists in saturated conditions. Therefore, none of the areas delineated meet the definition of a wetland provided in R315-301-2(86). The data sheets attached to this letter present results of soil and hydrology observations conducted by the wetland biologist who delineated the areas as presented on the figure attached to the Corps of Engineers letter. As presented on the site observation forms, the sites delineated are not associated with inundated or saturated conditions with the exception of the two very small locations defined as 19-8, and 21-1 as discussed earlier.

There are several criteria that outline location standards associated with wetlands for Class IV landfills in R315-302-1(2)(d). As stated earlier, we believe that all areas presented as non-jurisdictional wetlands in the figure accompanying the Corps of Engineers letter also do not meet the definition of wetlands as stated in the Utah Administrative Code. However, The following paragraphs address each of the criteria presented in the rule for wetlands.

R315-302-1(2)(d) Wetlands. No new facility or lateral expansion of an existing facility shall be located in wetlands unless the owner or operator demonstrates to the Executive Secretary that:

> **CRITERIA 1** - (i) Where applicable under section 404 of the Clean Water Act or applicable State wetland laws, the presumption that a practicable alternative to the proposed landfill is available which does not involve wetlands is clearly rebutted;
>
> **COMMENT 1** - The areas delineated are not regulated by section 404 of the Clean Water act as provided for in the letter from the Army Corps of Engineers dated March 18, 2009. As such, an alternatives analysis is not required.
>
> **CRITERIA 2** - (ii) The unit will not violate any applicable state water quality standards or section 307 of the Clean Water Act;

COMMENT 2 - Section 307 of the Clean Water Act addresses Toxic and Pretreatment Effluent Standards. As presented in the permit application, the quality of the ground water is very poor consisting of 23,000 to 29,000 mg/L TDS. This landfill unit is permitted to receive only inert type wastes as defined for Class IVb landfills and will not receive toxic materials. Storm water from exposed waste surfaces will be contained within the landfill footprint and will not be discharged. Therefore, no discharges from exposed wastes are expected and the Section 307 does not apply.

CRITERIA 3 - (iii) The unit will not jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat protected under the Endangered Species Act of 1973.

COMMENT 3 - A letter from the Utah Division of Wildlife Resources dated October 16, 2008 was provided in Exhibit E of the permit application stating that "The Utah Division of Wildlife Resources (UDWR) does not have records of the occurrence for any threatened, endangered, or sensitive species within the project area .... or within a 1-mile radius." The unit will, therefore, not jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat protected under the Endangered Species Act of 1973.

CRITERIA 4 - (iv) the unit will not cause or contribute to significant degradation of wetlands. The owner or operator must demonstrate the integrity of the unit and its ability to protect ecological resources by addressing the following factors:

(A) erosion, stability, and migration potential of native wetland soils, muds, and deposits used to support the unit;

(B) erosion, stability, and migration potential of dredged and fill materials used to support the unit;

(C) the volume and chemical nature of the waste managed in the unit;

(D) impacts on fish, wildlife, and other aquatic resources and their habitat from release of solid waste;

(E) the potential effects of catastrophic release of waste to the wetland and the resulting impacts on environment; and

(F) any additional factors, as necessary, to demonstrate that ecological resources in the wetland are sufficiently protected;

COMMENT 4 - We believe that all areas delineated in the figure attached to the letter from the Corps of Engineers do not meet the State of Utah definition of wetlands presented in R315-301-2(86). However, we will address each criteria presented above.

(A) Erosion and stability calculations have been completed and are presented in the permit application that demonstrate that the native soils will support the landfill unit;

(B) There will be no dredged materials and erosion and stability calculations have been completed and are presented in the permit application that demonstrate that the on-site soils may be used as fill materials and will support the landfill unit;

(C) The waste managed in the unit will consist of those materials acceptable in a Class IVb landfill. These are waste defined by R315-301-2(10);

(D) There are no fish or aquatic resources or habitats on the property. The gravel pit is the only site on the property that includes surface water or saturated soils. The surface water and saturated soil conditions only occur seasonally and will become non existent upon implementation of the storm drainage system for the site. Water in the gravel pit has only been used for stock watering and not for the support of wildlife.

(E) Landfill design parameters include seismic conditions and 100-year precipitation events. The only potential releases from catastrophic conditions would occur from storm water containment facilities within the landfill footprint designed to contain runoff from exposed waste surfaces. Since there are no wetlands meeting the regulatory definition in the administrative code, and since Class IVb landfills can only accept waste types defined by R315-301-2(10), possible releases from large precipitation events should not have an impact on wetlands or the environment.

(F) The sites delineated on the property do not meet the regulatory definition of wetlands and are not ecologically sensitive. The sites are also not regulated under Section 404 of the Clean Water Act and require no permits for modifying or changing these areas.

CRITERIA 5 - (v) to the extent required under section 404 of the Clean Water Act or applicable state wetlands laws, steps have been taken to attempt to achieve no net loss of wetlands, as defined by acreage and function, by first avoiding impacts to wetlands to the maximum extent practicable as required by Subsection R315-302-1(2)(d)(I), then minimizing unavoidable impacts to the maximum extent practicable, and finally offsetting remaining unavoidable wetland impacts through all appropriate and practicable compensatory mitigation actions (e.g., restoration of existing degraded wetlands or creation of man-made wetlands); and

COMMENT 5 - The sites delineated on this property are not regulated and are non-jurisdictional under Section 404 of the Clean Water Act as demonstrated by the March 18, 2009 letter received by the Corps of Engineers.

CRITERIA 6 - (vi) *sufficient information is available to make reasonable determination with respect to these demonstrations.*

COMMENT 6 - The information provided in the March 18, 2009 letter from the Corps of Engineers and the information presented in this letter are sufficient to demonstrate that the site delineated on the property are not regulated under Section 404 of the Clean Water Act and do not meet the definition of wetlands provided by R315-301-2(86) of the Utah Administrative Code. All other information contained herein and in the permit application demonstrates that the landfill is designed with appropriate site considerations.

Please include this letter and supporting observation forms in Exhibit E of the permit application and feel free to call if you need any additional information for your review of the permit application.

Sincerely,

HANSEN, ALLEN & LUCE, INC.

Kent L. Staheli

Kent C. Staheli, P.E.
Principal

attachments

SOIL

Sampling Point: 1-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 3/2	100					Cl	Damp
4 - 10	10YR 4/2	60	7.5YR 3/4	40			ClLo	Saturated
10 - 12	10YR 2/2	100					Organic	Saturated
12 – 18+	10YR 4/2	100					Sa	Standing water

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X No ___

Remarks:

Soils depleted below dark surface.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- X Water Marks (B1) (**Nonriverine**)
- X Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		X	
Water Table Present?	X		12
Saturation Present? (includes capillary fringe)	X		10

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Saturated at 10", water at 12"

SOIL

Sampling Point: 1-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 3/2	100					Cl	Damp
4 - 10	10YR 4/2	60	7.5YR 3/4	40			ClLo	Saturated
10 - 12	10YR 2/2	100					Organic	Saturated
12 – 18+	10YR 4/2	100					Sa	Standing water

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks:

Soils depleted below dark surface.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- X Water Marks (B1) (**Nonriverine**)
- X Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): 12

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

aturated at 12"

SOIL

Sampling Point: 1-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 2	10YR 2/2	100					Lo	damp
2+	10YR 3/2						SaGr	Fill

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ___ No X

Remarks:

No indications of hydric soils.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No indications of wetland hydrology

SOIL

Sampling Point: 2-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 – 2+							Gr	Undigable, coarse gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: Gravel

Depth (inches): 0+

Hydric Soil Present? Yes ___ No X

Remarks:

No indications of hydric soils.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes ___ No X Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No indications of wetland hydrology.

SOIL

Sampling Point: 2-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 2	10YR 2/1	100					LoSa	Moist
2+							Gravel	Saturated

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: Gravel

Depth (inches): 2+

Hydric Soil Present? Yes X No ___

Remarks:

Gravelly substrate is saturated to within 2" of surface.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes X	No ___	Depth (inches): Unk
Saturation Present? (includes capillary fringe)	Yes X	No ___	Depth (inches): 2

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Saturation at 2".

SOIL

Sampling Point: 2-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
_X_ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? Yes _X_ No ___

Remarks:

Permanently Inundated.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

_X_ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
_X_ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
_X_ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
_X_ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes _X_ No ___ Depth (inches): 0 – 36+

Water Table Present? Yes ___ No ___ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No ___ Depth (inches): ______

Wetland Hydrology Present? Yes _X_ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Permanently Inundated

SOIL

Sampling Point: 3-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 8	10YR 3/2	100					SiLo	Damp
8 – 18+	10YR 4/2	100					SiLo	Damp

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ___ No X

Remarks:

Soils not hydric.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology

SOIL

Sampling Point: 4-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 8	10YR 3/2	100					SiLo	Damp
8 – 18+	10YR 4/2	100					ClLo	Damp

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5) (**LRR C**)
__ 1 cm Muck (A9) (**LRR D**)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1)
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

__ 1 cm Muck (A9) (**LRR C**)
__ 2 cm Muck (A10) (**LRR B**)
__ Reduced Vertic (F18)
__ Red Parent Material (TF2)
__ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ________

Depth (inches): ________

Hydric Soil Present? Yes ____ No X

Remarks:

No hydric soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1) (**Nonriverine**)
__ Sediment Deposits (B2) (**Nonriverine**)
__ Drift Deposits (B3) (**Nonriverine**)
__ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Water-Stained Leaves (B9)
__ Salt Crust (B11)
__ Biotic Crust (B12)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Plowed Soils (C6)
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water Marks (B1) (**Riverine**)
__ Sediment Deposits (B2) (**Riverine**)
__ Drift Deposits (B3) (**Riverine**)
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Thin Muck Surface (C7)
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ______
Water Table Present? Yes ____ No X Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ______

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology.

SOIL

Sampling Point: 5-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 10	10YR 4/1	100					ClLo	Moist
10+	10yr 6/2	100					Cl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ___
Depth (inches): ___

Hydric Soil Present? Yes X No ___

Remarks:

Playa soils, Salorthids are hydric by definition.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
X Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes ___ No X Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Surface cracks and hoof prints in the mud are indication of saturation.

SOIL

Sampling Point: 5-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 8	10YR 3/2	100					SiLo	Damp
8 – 18+	10YR 4/2	100					ClLo	Damp

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ______ No __X__

Remarks:

No hydric soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ______ No __X__ Depth (inches): ____________

Water Table Present? Yes ______ No __X__ Depth (inches): ____________

Saturation Present? (includes capillary fringe) Yes ______ No __X__ Depth (inches): ____________

Wetland Hydrology Present? Yes ______ No __X__

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology.

SOIL

Sampling Point: 6-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 5/2	100					ClLo	Moist
4 – 8	10YR 6/3	100					Cl	Moist
8+								Hard pan

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
_X_ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: Hard pan

Depth (inches): 8

Hydric Soil Present? Yes _X_ No ___

Remarks:

Playa soils, Salorthids are hydric by definition.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
_X_ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
_X_ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No _X_ Depth (inches): ______
Water Table Present? Yes ___ No _X_ Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ___ No _X_ Depth (inches): ______

Wetland Hydrology Present? Yes _X_ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Salt crust and cracked soils in a playa indicate wetland hydrology.

SOIL

Sampling Point: 6-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 4/2	100					ClLo	Moist
4 – 18+	7.5YR 6/3	100					ClLo	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ___

Depth (inches): ___

Hydric Soil Present? Yes ___ No X

Remarks:

No indications of hydric soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology

SOIL

Sampling Point: 6-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 5/2	100					ClLo	Moist
4 – 8	10YR 6/3	100					Cl	Moist
8+								Hard pan

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) **(LRR C)**
___ 1 cm Muck (A9) **(LRR D)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) **(LRR C)**
___ 2 cm Muck (A10) **(LRR B)**
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: Hard pan

Depth (inches): 8

Hydric Soil Present? Yes X No ___

Remarks:

Playa soils, Salorthids are hydric by definition.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) **(Nonriverine)**
___ Sediment Deposits (B2) **(Nonriverine)**
___ Drift Deposits (B3) **(Nonriverine)**
X Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
X Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) **(Riverine)**
___ Sediment Deposits (B2) **(Riverine)**
___ Drift Deposits (B3) **(Riverine)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes ___ No X Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Soil cracks and salt crust are indications of wetland hydrology

SOIL

Sampling Point: 6-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 2	10YR 3/2	100					ClLo	Moist
2 - 3	7.5YR 4/5	100					ClLo	Moist
3+	10YR 3/3	100					Cl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ___ No X

Remarks:

No hydric soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology

SOIL

Sampling Point: 6-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 4	2.5Y 5/2	100					Cl	Moist
4 - 7	2.5Y 6/2	100					Cl	Moist
7 – 10	2.5Y 6/2	95	2.5Y 5/6	5			Cl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes X No ___

Remarks:

Depleted matrix

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- X Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		X	
Water Table Present?		X	
Saturation Present? (includes capillary fringe)		X	

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Soil cracks evidence of ponding or saturation

SOIL

Sampling Point: 6-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 2	10YR 3/2	100					ClLo	Moist
2 - 3	7.5YR 4/5	100					ClLo	Moist
3+	10YR 3/3	100					Cl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5) (**LRR C**)
__ 1 cm Muck (A9) (**LRR D**)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1)
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

__ 1 cm Muck (A9) (**LRR C**)
__ 2 cm Muck (A10) (**LRR B**)
__ Reduced Vertic (F18)
__ Red Parent Material (TF2)
__ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ________

Depth (inches): ________

Hydric Soil Present? Yes ____ No X

Remarks:

No hydric soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1) (**Nonriverine**)
__ Sediment Deposits (B2) (**Nonriverine**)
__ Drift Deposits (B3) (**Nonriverine**)
__ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Water-Stained Leaves (B9)
__ Salt Crust (B11)
__ Biotic Crust (B12)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Plowed Soils (C6)
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water Marks (B1) (**Riverine**)
__ Sediment Deposits (B2) (**Riverine**)
__ Drift Deposits (B3) (**Riverine**)
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Thin Muck Surface (C7)
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____

Water Table Present? Yes ____ No X Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology

SOIL

Sampling Point: 6-7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 2	10YR 3/2	100					ClLo	Moist
2 - 3	7.5YR 4/5	100					ClLo	Moist
3 - 18+	10YR 3/3	100					Cl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]*Indicators of hydrophytic vegetation and wetland hydrology must be present.*

Restrictive Layer (if present):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? Yes ______ No X

Remarks:

No hydric soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ______ No X Depth (inches): ______
Water Table Present? Yes ______ No X Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ______ No X Depth (inches): ______

Wetland Hydrology Present? Yes ______ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology

SOIL

Sampling Point: 6-8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 2	10YR 3/2	100					ClLo	Moist
2 - 3	7.5YR 4/5	100					ClLo	Moist
3+	10YR 3/3	100					Cl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ *Sandy Mucky Mineral (S1)*
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ___ No _X_

Remarks:

No hydric soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ *Sediment Deposits (B2)* (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No _X_ Depth (inches): ______

Water Table Present? Yes ___ No _X_ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No _X_ Depth (inches): ______

Wetland Hydrology Present? Yes ___ No _X_

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology

SOIL

Sampling Point: 6-9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 4	2.5Y 5/2	100					Cl	Moist
4 - 7	2.5Y 6/2	100					Cl	Moist
7 - 10	2.5Y 6/2	95	2.5Y 5/6	5			Cl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) **(LRR C)**
___ 1 cm Muck (A9) **(LRR D)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
_X_ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) **(LRR C)**
___ 2 cm Muck (A10) **(LRR B)**
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes _X_ No ___

Remarks:

Depleted matrix

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) **(Nonriverine)**
___ Sediment Deposits (B2) **(Nonriverine)**
___ Drift Deposits (B3) **(Nonriverine)**
_X_ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) **(Riverine)**
___ Sediment Deposits (B2) **(Riverine)**
___ Drift Deposits (B3) **(Riverine)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No _X_ Depth (inches): ______
Water Table Present? Yes ___ No _X_ Depth (inches): ______
Saturation Present? (Includes capillary fringe) Yes ___ No _X_ Depth (inches): ______

Wetland Hydrology Present? Yes _X_ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Soil cracks evidence of ponding and wetland hydrology

SOIL

Sampling Point: 6-10

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 2	10YR 3/2	100					ClLo	Moist
2 - 3	7.5YR 4/5	100					ClLo	Moist
3+	10YR 3/3	100					Cl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ______
Depth (inches): ______

Hydric Soil Present? Yes ______ No X

Remarks:

No hydric soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ______ No X Depth (inches): ______
Water Table Present? Yes ______ No X Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ______ No X Depth (inches): ______

Wetland Hydrology Present? Yes ______ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology

SOIL

Sampling Point: 6-11

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 4	2.5Y 5/2	100					Cl	Moist
4 - 7	2.5Y 6/2	100					Cl	Moist
7 – 10	2.5Y 6/2	95	2.5Y 5/6	5			Cl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5) (**LRR C**)
__ 1 cm Muck (A9) (**LRR D**)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1)
__ Loamy Gleyed Matrix (F2)
X Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

__ 1 cm Muck (A9) (**LRR C**)
__ 2 cm Muck (A10) (**LRR B**)
__ Reduced Vertic (F18)
__ Red Parent Material (TF2)
__ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ________

Depth (inches): ________

Hydric Soil Present? Yes X No ___

Remarks:

Depleted matrix

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1) (**Nonriverine**)
__ Sediment Deposits (B2) (**Nonriverine**)
__ Drift Deposits (B3) (**Nonriverine**)
X Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Water-Stained Leaves (B9)
__ Salt Crust (B11)
__ Biotic Crust (B12)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Plowed Soils (C6)
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water Marks (B1) (**Riverine**)
__ Sediment Deposits (B2) (**Riverine**)
__ Drift Deposits (B3) (**Riverine**)
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Thin Muck Surface (C7)
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ______
Water Table Present? Yes ___ No X Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ______

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Soil cracks evidence of ponding and wetland hydrology

SOIL

Sampling Point: 6-12

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 3/2	100					Cl	Moist
4 - 7	2.5Y 5/2	100					Cl	Moist
7 - 10	10YR 6/3	100					Cl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
_X_ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes _X_ No ___

Remarks:

Playa soils, Salorthids are hydric by definition.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
_X_ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No _X_ Depth (inches): ______
Water Table Present? Yes ___ No _X_ Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ___ No _X_ Depth (inches): ______

Wetland Hydrology Present? Yes _X_ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Soil cracks evidence of ponding and wetland hydrology

SOIL

Sampling Point: 6-13

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 3/2	100					Sa	Moist
4 - 7	2.5Y 4/2	100					SaLo	Moist
7 – 10	10YR 6/3	95	10YR 5/2	5			Cl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X No ___

Remarks:

Playa soils – salorthids are hydric by definition.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- X Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ______

Water Table Present? Yes ___ No X Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ______

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Soil cracks evidence of ponding or saturation

SOIL

Sampling Point: 6-14

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 3/2	100					Cl	Moist
4 - 7	2.5Y 5/2	100					Cl	Moist
7 – 10	10YR 6/3	100					Cl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5) (**LRR C**)
__ 1 cm Muck (A9) (**LRR D**)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1)
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

__ 1 cm Muck (A9) (**LRR C**)
__ 2 cm Muck (A10) (**LRR B**)
__ Reduced Vertic (F18)
__ Red Parent Material (TF2)
X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ________

Depth (inches): ________

Hydric Soil Present? Yes X No ___

Remarks:

Playa soils, Salorthids are hydric by definition.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1) (**Nonriverine**)
__ Sediment Deposits (B2) (**Nonriverine**)
__ Drift Deposits (B3) (**Nonriverine**)
__ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Water-Stained Leaves (B9)
__ Salt Crust (B11)
__ Biotic Crust (B12)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Plowed Soils (C6)
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water Marks (B1) (**Riverine**)
__ Sediment Deposits (B2) (**Riverine**)
__ Drift Deposits (B3) (**Riverine**)
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Thin Muck Surface (C7)
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ____
Water Table Present? Yes ___ No X Depth (inches): ____
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ____

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology

SOIL

Sampling Point: 6-15

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 2	10YR 3/2	100					ClLo	Moist
2 - 3	7.5YR 4/5	100					ClLo	Moist
3+	10YR 3/3	100					Cl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) **(LRR C)**
___ 1 cm Muck (A9) **(LRR D)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) **(LRR C)**
___ 2 cm Muck (A10) **(LRR B)**
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ______
Depth (inches): ______

Hydric Soil Present? Yes ______ No __X__

Remarks:

No hydric soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) **(Nonriverine)**
___ Sediment Deposits (B2) **(Nonriverine)**
___ Drift Deposits (B3) **(Nonriverine)**
___ Surface Soil Cracks (B6)
___ *Inundation Visible on Aerial Imagery (B7)*
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) **(Riverine)**
___ Sediment Deposits (B2) **(Riverine)**
___ Drift Deposits (B3) **(Riverine)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No _X_	Depth (inches): ______
Water Table Present?	Yes ___	No _X_	Depth (inches): ______
Saturation Present? (includes capillary fringe)	Yes ___	No _X_	Depth (inches): ______

Wetland Hydrology Present? Yes ______ No __X__

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology

SOIL

Sampling Point: 6-16

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 3/2	100					Cl	Moist
4 - 7	2.5Y 5/2	100					Cl	Moist
7 – 10	10YR 6/3	100					Cl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5) (**LRR C**)
__ 1 cm Muck (A9) (**LRR D**)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1)
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

__ 1 cm Muck (A9) (**LRR C**)
__ 2 cm Muck (A10) (**LRR B**)
__ Reduced Vertic (F18)
__ Red Parent Material (TF2)
X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ____
Depth (inches): ____

Hydric Soil Present? Yes X No ___

Remarks:

Playa soils, Salorthids are hydric by definition.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1) (**Nonriverine**)
__ Sediment Deposits (B2) (**Nonriverine**)
__ Drift Deposits (B3) (**Nonriverine**)
__ Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Water-Stained Leaves (B9)
__ Salt Crust (B11)
__ Biotic Crust (B12)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Plowed Soils (C6)
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water Marks (B1) (**Riverine**)
__ Sediment Deposits (B2) (**Riverine**)
__ Drift Deposits (B3) (**Riverine**)
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Thin Muck Surface (C7)
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
No wetland hydrology evident.

SOIL

Sampling Point: 6-17

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 3/2	100					Cl	Moist
4 - 7	2.5Y 5/2	100					Cl	Moist
7 – 10	10YR 6/3	100					Cl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5) (**LRR C**)
__ 1 cm Muck (A9) (**LRR D**)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1)
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

__ 1 cm Muck (A9) (**LRR C**)
__ 2 cm Muck (A10) (**LRR B**)
__ Reduced Vertic (F18)
__ Red Parent Material (TF2)
X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ______
Depth (inches): ______

Hydric Soil Present? Yes X No ___

Remarks:

Playa soils, Salorthids are hydric by definition.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1) (**Nonriverine**)
__ Sediment Deposits (B2) (**Nonriverine**)
__ Drift Deposits (B3) (**Nonriverine**)
X Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Water-Stained Leaves (B9)
__ Salt Crust (B11)
__ Biotic Crust (B12)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Plowed Soils (C6)
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water Marks (B1) (**Riverine**)
__ Sediment Deposits (B2) (**Riverine**)
__ Drift Deposits (B3) (**Riverine**)
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Thin Muck Surface (C7)
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes ___ No X Depth (inches): ___
Saturation Present? (Includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Cracked soils are indication of wetland hydrology

SOIL

Sampling Point: 7-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 3	10YR 5/2	100					SiLo	Moist
3 - 18+	10YR 5/2	100					Cl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
_X_ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ____________
Depth (inches): ____________

Hydric Soil Present? Yes _X_ No ___

Remarks:

Playa soils, Salorthids are hydric by definition.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
_X_ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ *Water-Stained Leaves (B9)*
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ *FAC-Neutral Test (D5)*

Field Observations:

Surface Water Present? Yes ___ No _X_ Depth (inches): ______
Water Table Present? Yes ___ No _X_ Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ___ No _X_ Depth (inches): ______

Wetland Hydrology Present? Yes _X_ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Cracked soils are indication of wetland hydrology

SOIL

Sampling Point: 7-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features				Texture	Remarks
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0 – 6	10YR 3/2	100					SiLo	Moist
6 +	7.5YR 4/3	100					ClLo	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ______
Depth (inches): ______

Hydric Soil Present? Yes ___ No X

Remarks:

No hydric soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ______
Water Table Present? Yes ___ No X Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ______

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology

SOIL

Sampling Point: 8-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 3	10YR 5/2	100					SiLo	Moist
3+	10YR 5/2	100					Cl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- _X_ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes _X_ No ___

Remarks:

Playa soils, Salorthids are hydric by definition.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- _X_ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No _X_ Depth (inches): ___

Water Table Present? Yes ___ No _X_ Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No _X_ Depth (inches): ___

Wetland Hydrology Present? Yes _X_ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Cracked soils are indication of wetland hydrology

SOIL

Sampling Point: 9-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 3/2	100					SiLo	Moist
4 - 7	2.5Y 5/2	100					Cl	Moist
7 – 10	10YR 6/3	100					Cl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ___ No _X_

Remarks:

No hydric soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No _X_ Depth (inches): ______

Water Table Present? Yes ___ No _X_ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No _X_ Depth (inches): ______

Wetland Hydrology Present? Yes ___ No _X_

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology

SOIL

Sampling Point: 9-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 3	10YR 3/2	100					SiLo	Moist
3 - 8	10YR 6/4	100					SaGr	Damp
8+								Cemented, hard pan

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5) (**LRR C**)
__ 1 cm Muck (A9) (**LRR D**)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1)
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

__ 1 cm Muck (A9) (**LRR C**)
__ 2 cm Muck (A10) (**LRR B**)
__ Reduced Vertic (F18)
__ Red Parent Material (TF2)
X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: Cemented hard pan
Depth (inches): 8

Hydric Soil Present? Yes X No __

Remarks:

Salorthids

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1) (**Nonriverine**)
__ Sediment Deposits (B2) (**Nonriverine**)
__ Drift Deposits (B3) (**Nonriverine**)
X Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Water-Stained Leaves (B9)
__ Salt Crust (B11)
__ Biotic Crust (B12)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Plowed Soils (C6)
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water Marks (B1) (**Riverine**)
__ Sediment Deposits (B2) (**Riverine**)
__ Drift Deposits (B3) (**Riverine**)
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Thin Muck Surface (C7)
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes __ No X Depth (inches): __
Water Table Present? Yes __ No X Depth (inches): __
Saturation Present? (includes capillary fringe) Yes __ No X Depth (inches): __

Wetland Hydrology Present? Yes X No __

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Cracked soils indicate wetland hydrology

SOIL

Sampling Point: 10-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 8	10YR 3/2	100					SiLo	Damp
8 – 18+	10YR 4/2	100					SiLo	Damp

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) **(LRR C)**
___ 1 cm Muck (A9) **(LRR D)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) **(LRR C)**
___ 2 cm Muck (A10) **(LRR B)**
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? Yes ____ No X

Remarks:

Soils not hydric.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) **(Nonriverine)**
___ Sediment Deposits (B2) **(Nonriverine)**
___ Drift Deposits (B3) **(Nonriverine)**
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) **(Riverine)**
___ Sediment Deposits (B2) **(Riverine)**
___ Drift Deposits (B3) **(Riverine)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____

Water Table Present? Yes ____ No X Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology

SOIL

Sampling Point: 10-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 3	10YR 3/2	100					SiLo	Moist
3 - 18+	10YR 6/4	100					Cl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5) (**LRR C**)
__ 1 cm Muck (A9) (**LRR D**)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1)
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

__ 1 cm Muck (A9) (**LRR C**)
__ 2 cm Muck (A10) (**LRR B**)
__ Reduced Vertic (F18)
__ Red Parent Material (TF2)
X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ____
Depth (inches): ____

Hydric Soil Present? Yes X No __

Remarks:

Salorthids

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1) (**Nonriverine**)
__ Sediment Deposits (B2) (**Nonriverine**)
__ Drift Deposits (B3) (**Nonriverine**)
X Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Water-Stained Leaves (B9)
__ Salt Crust (B11)
__ Biotic Crust (B12)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Plowed Soils (C6)
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water Marks (B1) (**Riverine**)
__ Sediment Deposits (B2) (**Riverine**)
__ Drift Deposits (B3) (**Riverine**)
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Thin Muck Surface (C7)
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes __ No X Depth (inches): __
Water Table Present? Yes __ No X Depth (inches): __
Saturation Present? (includes capillary fringe) Yes __ No X Depth (inches): __

Wetland Hydrology Present? Yes X No __

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Cracked soils indicate wetland hydrology

SOIL

Sampling Point: 11-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 3	10YR 3/2	100					SiLo	Moist
3 – 18+	10YR 6/4	100					Cl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- _X_ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes _X_ No ___

Remarks:

Salorthids

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- _X_ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No _X_ Depth (inches): ______

Water Table Present? Yes ___ No _X_ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No _X_ Depth (inches): ______

Wetland Hydrology Present? Yes _X_ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Cracked soils indicate wetland hydrology

SOIL

Sampling Point: 11-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 8	10YR 3/2	100					SiLo	Damp
8 – 18+	10YR 4/2	100					SiLo	Damp

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) **(LRR C)**
___ 1 cm Muck (A9) **(LRR D)**
___ *Depleted Below Dark Surface* (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ *Depleted Dark Surface* (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) **(LRR C)**
___ 2 cm Muck (A10) **(LRR B)**
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ____ No X

Remarks:

Soils not hydric.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) **(Nonriverine)**
___ Sediment Deposits (B2) **(Nonriverine)**
___ Drift Deposits (B3) **(Nonriverine)**
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) **(Riverine)**
___ Sediment Deposits (B2) **(Riverine)**
___ Drift Deposits (B3) **(Riverine)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____

Water Table Present? Yes ____ No X Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology

SOIL

Sampling Point: 12-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 – 18+	2.5Y 5/2	70	10YR 5/6	30	C	M	SaCl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5) (**LRR C**)
__ 1 cm Muck (A9) (**LRR D**)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1)
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
X Redox Depressions (F8)
__ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

__ 1 cm Muck (A9) (**LRR C**)
__ 2 cm Muck (A10) (**LRR B**)
__ Reduced Vertic (F18)
__ Red Parent Material (TF2)
__ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ____
Depth (inches): ____

Hydric Soil Present? Yes X No ___

Remarks:

Redox Depressions

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1) (**Nonriverine**)
__ Sediment Deposits (B2) (**Nonriverine**)
__ Drift Deposits (B3) (**Nonriverine**)
X Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Water-Stained Leaves (B9)
X Salt Crust (B11)
__ Biotic Crust (B12)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Plowed Soils (C6)
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water Marks (B1) (**Riverine**)
__ Sediment Deposits (B2) (**Riverine**)
__ Drift Deposits (B3) (**Riverine**)
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Thin Muck Surface (C7)
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ____
Water Table Present? Yes ___ No X Depth (inches): ____
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ____

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Surface cracks and salt crust is evidence of ponding and wetland hydrology.

SOIL

Sampling Point: 12-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 – 18+	10YR 3/2	100					Sa	Dry to damp

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ___ No _X_

Remarks:

No hydric soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No _X_ Depth (inches): ______
Water Table Present? Yes ___ No _X_ Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ___ No _X_ Depth (inches): ______

Wetland Hydrology Present? Yes ___ No _X_

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology

SOIL

Sampling Point: 12-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 10	10YR 2/2	100					Sa	Dry
10+	10YR 4/3	100					Sa	Dry

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) **(LRR C)**
___ 1 cm Muck (A9) **(LRR D)**
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) **(LRR C)**
___ 2 cm Muck (A10) **(LRR B)**
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]*Indicators of hydrophytic vegetation and wetland hydrology must be present.*

Restrictive Layer (if present):
Type: ______
Depth (inches): ______

Hydric Soil Present? Yes ___ No X

Remarks:

No hydric soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) **(Nonriverine)**
___ Sediment Deposits (B2) **(Nonriverine)**
___ Drift Deposits (B3) **(Nonriverine)**
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) **(Riverine)**
___ Sediment Deposits (B2) **(Riverine)**
___ Drift Deposits (B3) **(Riverine)**
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ______
Water Table Present? Yes ___ No X Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ______

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology.

SOIL

Sampling Point: 13-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 – 18+	10YR 4/3	100					ClLo	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
_X_ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______________

Depth (inches): ______________

Hydric Soil Present? Yes _X_ No ____

Remarks:

Salorthids, playa

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
_X_ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
_X_ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ *Oxidized Rhizospheres along Living Roots (C3)*
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No _X_ Depth (inches): ______
Water Table Present? Yes ____ No _X_ Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ____ No _X_ Depth (inches): ______

Wetland Hydrology Present? Yes _X_ No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Salt crust and surface soil cracks = wetland hydrology

SOIL

Sampling Point: 13-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 10	10YR 2/2	100					Sa	Dry
10+	10YR 4/3	100					Sa	Dry

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ___ No X

Remarks:

No hydric soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ______

Water Table Present? Yes ___ No X Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ______

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology.

SOIL

Sampling Point: 14-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 10	10YR 4/1	100					ClLo	Moist
10+	10yr 6/2	100					Cl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5) (**LRR C**)
__ 1 cm Muck (A9) (**LRR D**)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1)
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

__ *1 cm Muck (A9)* (**LRR C**)
__ 2 cm Muck (A10) (**LRR B**)
__ Reduced Vertic (F18)
__ Red Parent Material (TF2)
X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X No ___

Remarks:

Playa soils, Salorthids are hydric by definition.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

__ Surface Water (A1)
__ High Water Table (A2)
__ *Saturation* (A3)
__ Water Marks (B1) (**Nonriverine**)
__ Sediment Deposits (B2) (**Nonriverine**)
__ Drift Deposits (B3) (**Nonriverine**)
X Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Water-Stained Leaves (B9)
__ Salt Crust (B11)
__ Biotic Crust (B12)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Plowed Soils (C6)
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water Marks (B1) (**Riverine**)
__ Sediment Deposits (B2) (**Riverine**)
__ Drift Deposits (B3) (**Riverine**)
__ *Drainage Patterns* (B10)
__ Dry-Season Water Table (C2)
__ Thin Muck Surface (C7)
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Surface cracks are indication of saturation.

SOIL

Sampling Point: 14-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 8	10YR 3/2	100					SiLo	Damp
8 – 18+	10YR 4/2	100					ClLo	Damp

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ___ No _X_

Remarks:

No hydric soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No _X_ Depth (inches): ______

Water Table Present? Yes ___ No _X_ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No _X_ Depth (inches): ______

Wetland Hydrology Present? Yes ___ No _X_

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology.

SOIL

Sampling Point: 15-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 10	10YR 4/1	100					ClLo	Moist
10+	10yr 6/2	100					Cl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
_X_ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes _X_ No ___

Remarks:

Playa soils, Salorthids are hydric by definition.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
_X_ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No _X_ Depth (inches): ______

Water Table Present? Yes ___ No _X_ Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No _X_ Depth (inches): ______

Wetland Hydrology Present? Yes _X_ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Surface cracks are indication of saturation.

SOIL

Sampling Point: 15-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 8	10YR 3/2	100					SiLo	Damp
8 – 18+	10YR 4/2	100					ClLo	Damp

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ____ No X

Remarks:

No hydric soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____

Water Table Present? Yes ____ No X Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology.

SOIL

Sampling Point: 16-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 10	10YR 4/1	100					ClLo	Moist
10+	10yr 6/2	100					Cl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless *otherwise noted.*)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ *Sandy Mucky Mineral (S1)*
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ *Vernal Pools (F9)*

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
_X_ Other (Explain in Remarks)

[3]*Indicators of hydrophytic vegetation and* wetland hydrology must be present.

Restrictive Layer (if present):
Type: ______
Depth (inches): ______

Hydric Soil Present? Yes _X_ No ___

Remarks:

Playa soils, Salorthids are hydric by definition.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
_X_ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No _X_ Depth (inches): ______
Water Table Present? Yes ___ No _X_ Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ___ No _X_ Depth (inches): ______

Wetland Hydrology Present? Yes _X_ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Surface cracks are indication of saturation.

SOIL

Sampling Point: 16-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 8	10YR 3/2	100					SiLo	Damp
8 – 18+	10YR 4/2	100					ClLo	Damp

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ___ No X

Remarks:

No hydric soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ______
Water Table Present? Yes ___ No X Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ______

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology.

SOIL

Sampling Point: 17-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 10	10YR 4/1	100					ClLo	Moist
10+	10yr 6/2	100					Cl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- _X_ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes _X_ No ___

Remarks:

Playa soils, Salorthids are hydric by definition.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- _X_ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No _X_	Depth (inches): ___
Water Table Present?	Yes ___	No _X_	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No _X_	Depth (inches): ___

Wetland Hydrology Present? Yes _X_ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Surface cracks are indication of saturation.

SOIL

Sampling Point: 17-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 8	10YR 3/2	100					SiLo	Damp
8 – 18+	10YR 4/2	100					ClLo	Damp

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ___ No X

Remarks:

No hydric soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology.

SOIL

Sampling Point: 18-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 10	10YR 4/1	100					ClLo	Moist
10+	10yr 6/2	100					Cl	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- __ Histosol (A1)
- __ Histic Epipedon (A2)
- __ Black Histic (A3)
- __ Hydrogen Sulfide (A4)
- __ Stratified Layers (A5) (**LRR C**)
- __ 1 cm Muck (A9) (**LRR D**)
- __ Depleted Below Dark Surface (A11)
- __ Thick Dark Surface (A12)
- __ Sandy Mucky Mineral (S1)
- __ Sandy Gleyed Matrix (S4)
- __ Sandy Redox (S5)
- __ Stripped Matrix (S6)
- __ Loamy Mucky Mineral (F1)
- __ Loamy Gleyed Matrix (F2)
- __ Depleted Matrix (F3)
- __ Redox Dark Surface (F6)
- __ Depleted Dark Surface (F7)
- __ Redox Depressions (F8)
- __ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- __ 1 cm Muck (A9) (**LRR C**)
- __ 2 cm Muck (A10) (**LRR B**)
- __ Reduced Vertic (F18)
- __ Red Parent Material (TF2)
- X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ______
Depth (inches): ______

Hydric Soil Present? Yes X No ___

Remarks:

Playa soils, Salorthids are hydric by definition.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- __ Surface Water (A1)
- __ High Water Table (A2)
- __ Saturation (A3)
- __ Water Marks (B1) (**Nonriverine**)
- __ Sediment Deposits (B2) (**Nonriverine**)
- __ Drift Deposits (B3) (**Nonriverine**)
- X Surface Soil Cracks (B6)
- __ Inundation Visible on Aerial Imagery (B7)
- __ Water-Stained Leaves (B9)
- __ Salt Crust (B11)
- __ Biotic Crust (B12)
- __ Aquatic Invertebrates (B13)
- __ Hydrogen Sulfide Odor (C1)
- __ Oxidized Rhizospheres along Living Roots (C3)
- __ Presence of Reduced Iron (C4)
- __ Recent Iron Reduction in Plowed Soils (C6)
- __ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- __ Water Marks (B1) (**Riverine**)
- __ Sediment Deposits (B2) (**Riverine**)
- __ Drift Deposits (B3) (**Riverine**)
- __ Drainage Patterns (B10)
- __ Dry-Season Water Table (C2)
- __ Thin Muck Surface (C7)
- __ Crayfish Burrows (C8)
- __ Saturation Visible on Aerial Imagery (C9)
- __ Shallow Aquitard (D3)
- __ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ____
Water Table Present? Yes ___ No X Depth (inches): ____
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ____

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Surface cracks are indication of saturation.

SOIL

Sampling Point: 18-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 8	10YR 3/2	100					SiLo	Damp
8 – 18+	10YR 4/2	100					ClLo	Damp

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ____________
Depth (inches): ____________

Hydric Soil Present? Yes ______ No __X__

Remarks:

No hydric soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ______ No __X__ Depth (inches): ____________
Water Table Present? Yes ______ No __X__ Depth (inches): ____________
Saturation Present? (includes capillary fringe) Yes ______ No __X__ Depth (inches): ____________

Wetland Hydrology Present? Yes ______ No __X__

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology.

SOIL

Sampling Point: 18-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 3/2	100					ClLo	damp
4 - 12	10YR 6/2	100					Cl	Moist
12+								Hard pan

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5) (**LRR C**)
__ 1 cm Muck (A9) (**LRR D**)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1)
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

__ 1 cm Muck (A9) (**LRR C**)
__ 2 cm Muck (A10) (**LRR B**)
__ Reduced Vertic (F18)
__ Red Parent Material (TF2)
X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: Cemented
Depth (inches): 12

Hydric Soil Present? Yes X No __

Remarks:

Salorthids

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1) (**Nonriverine**)
__ Sediment Deposits (B2) (**Nonriverine**)
__ Drift Deposits (B3) (**Nonriverine**)
X Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Water-Stained Leaves (B9)
__ Salt Crust (B11)
__ Biotic Crust (B12)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Plowed Soils (C6)
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water Marks (B1) (**Riverine**)
__ Sediment Deposits (B2) (**Riverine**)
__ Drift Deposits (B3) (**Riverine**)
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Thin Muck Surface (C7)
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes __ No X Depth (inches): __
Water Table Present? Yes __ No X Depth (inches): __
Saturation Present? (includes capillary fringe) Yes __ No X Depth (inches): __

Wetland Hydrology Present? Yes X No __

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Surface soil cracks = wetland hydrology

SOIL

Sampling Point: 19-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 5	10YR 4/2	100					Cl	Moist
5 - 7	10YR 5/3	100					ClSa	Moist
7+								Hard pan

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: Cemented

Depth (inches): 7

Hydric Soil Present? Yes X No ___

Remarks:

Salorthids, playa soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- X Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- X Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Soil surface cracks and salt crust = wetland hydrology.

SOIL

Sampling Point: 19-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 10	10YR 2/2	100					Sa	Dry
10+	10YR 4/3	100					Sa	Dry

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes ___ No X

Remarks:

No hydric soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology.

SOIL

Sampling Point: 19-3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 3	10YR 3/2	100					ClLo	damp
2 – 18+	10YR 4/2	60	10YR 6/2	40	C	M		

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
_X_ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes _X_ No ___

Remarks:

Salorthids

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
_X_ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No _X_ Depth (inches): ____
Water Table Present? Yes ___ No _X_ Depth (inches): ____
Saturation Present? (includes capillary fringe) Yes ___ No _X_ Depth (inches): ____

Wetland Hydrology Present? Yes _X_ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Surface soil cracks = wetland hydrology

SOIL

Sampling Point: 19-4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 – 18+	10YR 3/2	100					Sa	Dry to damp

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ____________

Depth (inches): ____________

Hydric Soil Present? Yes ____ No X

Remarks:

No hydric soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____

Water Table Present? Yes ____ No X Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology

SOIL

Sampling Point: 19-5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 3/2	100					ClLo	Moist
4 - 10	10YR 4/3	100					Cl	Moist
10+								Hard pan

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: Cemented

Depth (inches): 10

Hydric Soil Present? Yes X No ___

Remarks:

Salorthids, playa soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
X Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes ___ No X Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Soil surface cracks = wetland hydrology.

SOIL

Sampling Point: 19-6

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 3	10YR 3/2	100					SaLo	Moist
3 - 12	10YR 4/3	100					Sa	Moist
12+								Hard pan

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: Cemented

Depth (inches): 10

Hydric Soil Present? Yes X No ___

Remarks:

Salorthids, playa soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology.

SOIL

Sampling Point: 19-7

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 3	10YR 3/2	100					SaLo	Moist
3 - 18+	10YR 4/3	100					Sa	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X No ___

Remarks:

Salorthids, playa soils

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- X Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- X Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Soil surface cracks and salt crust = wetland hydrology.

SOIL

Sampling Point: 19-8

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 3/2	100					Cl	Damp
4 - 6	10YR 4/2	100					Cl	moist
6 – 18+	10YR 4/2	90	10YR 6/4	10			Cl	saturated

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
X Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X No ___

Remarks:

Depleted below dark surface

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
X Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
X Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ______
Water Table Present? Yes ___ No X Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes X No ___ Depth (inches): ______

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Saturated at 6", surface soil cracks = wetland hydrology

SOIL

Sampling Point: 19-9

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 - 2	10YR 3/2	100					Lo	damp
2+								Hard pan

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: Cemented

Depth (inches): 2

Hydric Soil Present? Yes ___ No X

Remarks:

No hydric soil indicators

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes ___ No X Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology

SOIL

Sampling Point: 20-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 3	10YR 3/2	100					SaLo	Moist
3 – 18+	10YR 4/3	100					Sa	Moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) **(LRR C)**
- ___ 1 cm Muck (A9) **(LRR D)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR C)**
- ___ 2 cm Muck (A10) **(LRR B)**
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X No ___

Remarks:

Salorthids

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) **(Nonriverine)**
- ___ Sediment Deposits (B2) **(Nonriverine)**
- ___ Drift Deposits (B3) **(Nonriverine)**
- X Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) **(Riverine)**
- ___ Sediment Deposits (B2) **(Riverine)**
- ___ Drift Deposits (B3) **(Riverine)**
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ______

Water Table Present? Yes ___ No X Depth (inches): ______

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ______

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Surface soil cracks = wetland hydrology

SOIL

Sampling Point: 20-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 – 4	10YR 2/2	100					ClLo	Damp

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: Cemented
Depth (inches): 4

Hydric Soil Present? Yes ___ No X

Remarks:

No hydric indicators

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes ___ No X Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology.

SOIL

Sampling Point: 21-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 12	10YR 3/1	100					ClLo	Moist
12 +	10YR 4/1	100					Cl	Saturated

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- X Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: ______

Depth (inches): ______

Hydric Soil Present? Yes X No ___

Remarks:

Depleted below dark surface

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?		X	
Water Table Present?		X	
Saturation Present? (includes capillary fringe)	X		12

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Saturated at 12"

SOIL

Sampling Point: 21-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0 – 4	10YR 3/2	100					ClLo	Damp
4+								Hard pan

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: Cemented
Depth (inches): 4

Hydric Soil Present? Yes ___ No X

Remarks:

No indications of hydric soils.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes ___ No X Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology

SOIL

Sampling Point: 22-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 3/2	100					ClLo	Damp
4 - 6	10YR 4/3	100					Cl	Damp
6 +	10YR 6/2	100						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5) (**LRR C**)
__ 1 cm Muck (A9) (**LRR D**)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1)
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

__ 1 cm Muck (A9) (**LRR C**)
__ 2 cm Muck (A10) (**LRR B**)
__ Reduced Vertic (F18)
__ Red Parent Material (TF2)
X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ____
Depth (inches): ____

Hydric Soil Present? Yes X No __

Remarks:

Salorthids

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1) (**Nonriverine**)
__ Sediment Deposits (B2) (**Nonriverine**)
__ Drift Deposits (B3) (**Nonriverine**)
X Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Water-Stained Leaves (B9)
__ Salt Crust (B11)
__ Biotic Crust (B12)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Plowed Soils (C6)
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water Marks (B1) (**Riverine**)
__ Sediment Deposits (B2) (**Riverine**)
__ Drift Deposits (B3) (**Riverine**)
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Thin Muck Surface (C7)
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes __	No X	Depth (inches): __
Water Table Present?	Yes __	No X	Depth (inches): __
Saturation Present? (includes capillary fringe)	Yes __	No X	Depth (inches): __

Wetland Hydrology Present? Yes X No __

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Surface soil cracks = wetland hydrology

SOIL

Sampling Point: 22-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 – 4	10YR 3/2	100					ClLo	Damp
4+								Hard pan

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):

Type: Cemented

Depth (inches): 4

Hydric Soil Present? Yes ___ No X

Remarks:

No indications of hydric soils.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
___ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
___ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___
Water Table Present? Yes ___ No X Depth (inches): ___
Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology

SOIL

Sampling Point: 23-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 10	10YR 3/2	100					ClLo	Damp
10 – 18+	10YR 4/2	100					Cl	Damp

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5) (**LRR C**)
__ 1 cm Muck (A9) (**LRR D**)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1)
__ Loamy Gleyed Matrix (F2)
X Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

__ 1 cm Muck (A9) (**LRR C**)
__ 2 cm Muck (A10) (**LRR B**)
__ Reduced Vertic (F18)
__ Red Parent Material (TF2)
X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: _____
Depth (inches): _____

Hydric Soil Present? Yes X No ___

Remarks:

Salorthids. May also meet criteria for depleted matrix.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1) (**Nonriverine**)
__ Sediment Deposits (B2) (**Nonriverine**)
__ Drift Deposits (B3) (**Nonriverine**)
X Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Water-Stained Leaves (B9)
__ Salt Crust (B11)
__ Biotic Crust (B12)
__ Aquatic Invertebrates (B13)
__ *Hydrogen Sulfide Odor (C1)*
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Plowed Soils (C6)
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water Marks (B1) (**Riverine**)
__ Sediment Deposits (B2) (**Riverine**)
__ Drift Deposits (B3) (**Riverine**)
__ Drainage Patterns (B10)
__ *Dry-Season Water Table (C2)*
__ Thin Muck Surface (C7)
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Surface soil cracks = wetland hydrology

SOIL

Sampling Point: 24-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 3/2	100					ClLo	Damp
4 - 6	10YR 4/3	100					Cl	Damp
6 +	10YR 6/2	100					Cl	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5) (**LRR C**)
__ 1 cm Muck (A9) (**LRR D**)
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Sandy Mucky Mineral (S1)
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Loamy Mucky Mineral (F1)
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

__ 1 cm Muck (A9) (**LRR C**)
__ 2 cm Muck (A10) (**LRR B**)
__ Reduced Vertic (F18)
__ Red Parent Material (TF2)
X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ____
Depth (inches): ____

Hydric Soil Present? Yes X No __

Remarks:

Salorthids

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

__ Surface Water (A1)
__ High Water Table (A2)
__ Saturation (A3)
__ Water Marks (B1) (**Nonriverine**)
__ Sediment Deposits (B2) (**Nonriverine**)
__ Drift Deposits (B3) (**Nonriverine**)
X Surface Soil Cracks (B6)
__ Inundation Visible on Aerial Imagery (B7)
__ Water-Stained Leaves (B9)
X Salt Crust (B11)
__ Biotic Crust (B12)
__ Aquatic Invertebrates (B13)
__ Hydrogen Sulfide Odor (C1)
__ Oxidized Rhizospheres along Living Roots (C3)
__ Presence of Reduced Iron (C4)
__ Recent Iron Reduction in Plowed Soils (C6)
__ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

__ Water Marks (B1) (**Riverine**)
__ Sediment Deposits (B2) (**Riverine**)
__ Drift Deposits (B3) (**Riverine**)
__ Drainage Patterns (B10)
__ Dry-Season Water Table (C2)
__ Thin Muck Surface (C7)
__ Crayfish Burrows (C8)
__ Saturation Visible on Aerial Imagery (C9)
__ Shallow Aquitard (D3)
__ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes __ No X Depth (inches): ____
Water Table Present? Yes __ No X Depth (inches): ____
Saturation Present? (includes capillary fringe) Yes __ No X Depth (inches): ____

Wetland Hydrology Present? Yes X No __

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Surface soil cracks and salt crust = wetland hydrology

SOIL

Sampling Point: 24-2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 – 4	10YR 3/2	100					ClLo	Damp
4+								Hard pan

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- ___ Other (Explain in Remarks)

[3]*Indicators of hydrophytic vegetation and wetland hydrology must be present.*

Restrictive Layer (if present):

Type: Cemented

Depth (inches): 4

Hydric Soil Present? Yes ___ No X

Remarks:

No indications of hydric soils.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No X Depth (inches): ___

Water Table Present? Yes ___ No X Depth (inches): ___

Saturation Present? (includes capillary fringe) Yes ___ No X Depth (inches): ___

Wetland Hydrology Present? Yes ___ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

No wetland hydrology

SOIL

Sampling Point: 25-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 3/2	100					ClLo	Damp
4 - 6	10YR 4/3	100					Cl	Damp
6 +	10YR 6/2	100						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

___ Histosol (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Stratified Layers (A5) (**LRR C**)
___ 1 cm Muck (A9) (**LRR D**)
___ Depleted Below Dark Surface (A11)
___ Thick Dark Surface (A12)
___ Sandy Mucky Mineral (S1)
___ Sandy Gleyed Matrix (S4)
___ Sandy Redox (S5)
___ Stripped Matrix (S6)
___ Loamy Mucky Mineral (F1)
___ Loamy Gleyed Matrix (F2)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

___ 1 cm Muck (A9) (**LRR C**)
___ 2 cm Muck (A10) (**LRR B**)
___ Reduced Vertic (F18)
___ Red Parent Material (TF2)
_X_ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ____________
Depth (inches): ____________

Hydric Soil Present? Yes _X_ No ___

Remarks:

Salorthids

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

___ Surface Water (A1)
___ High Water Table (A2)
___ Saturation (A3)
___ Water Marks (B1) (**Nonriverine**)
___ Sediment Deposits (B2) (**Nonriverine**)
___ Drift Deposits (B3) (**Nonriverine**)
_X_ Surface Soil Cracks (B6)
___ Inundation Visible on Aerial Imagery (B7)
___ Water-Stained Leaves (B9)
_X_ Salt Crust (B11)
___ Biotic Crust (B12)
___ Aquatic Invertebrates (B13)
___ Hydrogen Sulfide Odor (C1)
___ Oxidized Rhizospheres along Living Roots (C3)
___ Presence of Reduced Iron (C4)
___ Recent Iron Reduction in Plowed Soils (C6)
___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

___ Water Marks (B1) (**Riverine**)
___ Sediment Deposits (B2) (**Riverine**)
___ Drift Deposits (B3) (**Riverine**)
___ Drainage Patterns (B10)
___ Dry-Season Water Table (C2)
___ Thin Muck Surface (C7)
___ Crayfish Burrows (C8)
___ Saturation Visible on Aerial Imagery (C9)
___ Shallow Aquitard (D3)
___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ___ No _X_ Depth (inches): ______
Water Table Present? Yes ___ No _X_ Depth (inches): ______
Saturation Present? (includes capillary fringe) Yes ___ No _X_ Depth (inches): ______

Wetland Hydrology Present? Yes _X_ No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Surface soil cracks and salt crust = wetland hydrology

SOIL

Sampling Point: 26-1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 - 4	10YR 3/2	100					ClLo	Damp
4 - 6	10YR 4/3	100					Cl	Damp
6 +	10YR 6/2	100						

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix. [2]Location: PL=Pore Lining, RC=Root Channel, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5) (**LRR C**)
- ___ 1 cm Muck (A9) (**LRR D**)
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Loamy Mucky Mineral (F1)
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) (**LRR C**)
- ___ 2 cm Muck (A10) (**LRR B**)
- ___ Reduced Vertic (F18)
- ___ Red Parent Material (TF2)
- X Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present.

Restrictive Layer (if present):
Type: ______
Depth (inches): ______

Hydric Soil Present? Yes X No ___

Remarks:

Salorthids

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1) (**Nonriverine**)
- ___ Sediment Deposits (B2) (**Nonriverine**)
- ___ Drift Deposits (B3) (**Nonriverine**)
- X Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- X Salt Crust (B11)
- ___ Biotic Crust (B12)
- ___ Aquatic Invertebrates (B13)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Plowed Soils (C6)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water Marks (B1) (**Riverine**)
- ___ Sediment Deposits (B2) (**Riverine**)
- ___ Drift Deposits (B3) (**Riverine**)
- ___ Drainage Patterns (B10)
- ___ Dry-Season Water Table (C2)
- ___ Thin Muck Surface (C7)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No X	Depth (inches): ___
Water Table Present?	Yes ___	No X	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No X	Depth (inches): ___

Wetland Hydrology Present? Yes X No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Surface soil cracks and salt crust = wetland hydrology

EXHIBIT F

Letter From:

State of Utah
Department of Natural Resources
Division of Wildlife Resources

October 16, 2008

Species of Concern Near Proposed Landfill Site in Weber County, Utah

JON M. HUNTSMAN, JR.
Governor
GARY R. HERBERT
Lieutenant Governor

State of Utah

DEPARTMENT OF NATURAL RESOURCES
MICHAEL R. STYLER
Executive Director
Division of Wildlife Resources
JAMES F. KARPOWITZ
Division Director

October 16, 2008

Gordon Jones
Hansen, Allen & Luce, Inc.
6771 South 900 East
Midvale, Utah 84047

Subject: Species of Concern Near Proposed Landfill Site in Weber County, Utah

Dear Gordon Jones:

I am writing in response to your email dated October 16, 2008 regarding information on species of special concern proximal to the proposed waste landfill site to be located in Section 19 of Township 6 North, Range 3 West, SLB&M in Weber County, Utah.

The Utah Division of Wildlife Resources (UDWR) does not have records of occurrence for any threatened, endangered, or sensitive species within the project area noted above or within a 1-mile radius.

The information provided in this letter is based on data existing in the Utah Division of Wildlife Resources' central database at the time of the request. It should not be regarded as a final statement on the occurrence of any species on or near the designated site, nor should it be considered a substitute for on-the-ground biological surveys. Moreover, because the Utah Division of Wildlife Resources' central database is continually updated, and because data requests are evaluated for the specific type of proposed action, any given response is only appropriate for its respective request.

In addition to the information you requested, other significant wildlife values might also be present on the designated site. Please contact UDWR's habitat manager for the northern region, Scott Walker, at (801) 476-2776 if you have any questions.

Please contact our office at (801) 538-4759 if you require further assistance.

Sincerely,

Sarah Lindsey

Sarah Lindsey
Information Manager
Utah Natural Heritage Program

cc: Scott Walker, NRO

UTAH DNR WILDLIFE RESOURCES

EXHIBIT G

Operational and Reporting Forms

WEBER COUNTY C&D LANDFILL
INSPECTION FORM

Inspection Area	Compliant			Comments or Corrective Action
	Yes	No	NA	
General				
Litter Control				
Dust Control				
Equipment Maintenance (per manufacturer)				
Quarterly				
Storm Drainage Ditches, Pipes, and Ponds				
Storm Drainage Inlet / Outlet Structures				
Oil / Water Separators In-Place				
Equipment Staging Areas Clean				
Operations Area Clean				
Wash / Maintenance Areas				
Semi-Annual				
Perimeter Security Fences				
Access Road and Gate				
Debris Fences				
Fuel Storage Tanks				
Annual				
Final Closure Cover				
Erosion Control Vegetation / Covers				
Post-Closure				

FORM(S) MAY BE MODIFIED TO MEET FACILITY OPERATIONAL, INSPECTION, AND REPORTING NEEDS, AND PERMIT AND REGULATORY REQUIREMENTS

Name

Date

WEBER COUNTY CORP. CLASS IVb C&D LANDFILL MOULDING & SONS LANDFILL, LLC

WASTE DELIVERY RECORD

Date	Customer Name/ Signature	Job Name/No.	License or Truck No.	Load Type	Load Size

FORM(S) MAY BE MODIFIED TO MEET FACILITY OPERATIONAL, INSPECTION, AND REPORTING NEEDS, AND PERMIT AND REGULATORY REQUIREMENTS

EXHIBIT H

STORM WATER POLLUTION PREVENTION PLAN

STORM WATER DISCHARGE PERMIT

STORM WATER POLLUTION PREVENTION PLAN FOR CONSTRUCTION ACTIVITIES

FOR

MOULDING & SONS OFFICE SITE
OGDEN, UTAH

PROFESSIONAL ENGINEER
GORDON L. JONES
No. 5048470-2202
7/15/08
STATE OF UTAH

Project Engineer

Prepared by

Hansen, Allen & Luce, Inc.
6771 South 900 East
Midvale, Utah 84047
801-566-5599

July 2008

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

[name]
[title]

SITE CONTACT INFORMATION

SITE OWNER	***PHONE/FAX***	***ADDRESS***
Randy Moulding	***Telephone: 801-399-9994*** ***Facsimile: 801-725-2722***	***910 West 21st Street*** ***Ogden, Utah 84404***
PROJECT CONTRACTOR		
PROJECT EROSION LEAD	***24-HOUR CONTACT***	
Randy Moulding	***Telephone: 801-399-9994*** ***Facsimile: 801-725-2722***	***910 West 21st Street*** ***Ogden, Utah 84404***

Revision Schedule

This storm water pollution prevention plan (SWPPP) should be revised and updated to address changes in site conditions, new or revised government regulations, and additional on-site storm water pollution controls.

All revisions to the SWPPP must be documented on the SWPPP Revision Documentation Form, which should include the information shown below. The authorized facility representative who approves the SWPPP should be an individual at or near the top of the facility's management organization, such as the president, vice president, construction manager, site supervisor, or environmental manager. The signature of this representative attests that the SWPPP revision information is true and accurate. Previous authors and facility representatives are not responsible for the revisions.

SWPPP Revision Documentation Form

Number	Date	Author	Company Representative Signature
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

CONTENTS

CONTENTS (Continued)

CONTENTS (Continued)

FIGURES AND DRAWINGS

1 CONSTRUCTION ENVIRONMENTAL SUMMARY

1.1 Summary

Beginning in the Summer of 2008, Moulding & Sons, Inc. is starting a construction project located at approximately 900 South and 11500 West in Weber County, Utah. The project will consist of an access road and office site (10' x 60' trailer), with asphalt and graveled areas.

The improvements planned for this site will disturb a relatively small area (2 acres) versus the total size of the parcel (114 acres). The site slopes down from 900 South at about 12% for 450 feet to the south in the area of the construction project. Following this initial decline, the property is relatively flat with less than a 0.5% grade the roughly 1,500 feet to the southern edge of the property. Currently there is one 24-inch culvert at the south end of the property that directs runoff under the railroad and into neighboring property that eventually drains to the Great Salt Lake. There are no defined drainage ditches or streams, either ephemeral or perennial, that would receive any waters from the parcel. There are wetlands located to the south of the project site, both on the parcel owned by Moulding & Sons, Inc. and on property to the south of the railroad, that eventually drain to the Great Salt Lake. These wetlands are dry during most of the year.

This *Storm Water Pollution Prevention Plan* (SWPPP) details anticipated protective environmental measures, that will be employed during construction of the project. Modifications to the measures detailed herein will be implemented should needed modifications become apparent during construction or site evaluations.

1.1.1 Project Description

The project will be located on about 3 acres, with a 600 square feet trailer, about 53,000 square feet of asphalted area (will probably be gravel for awhile before it is paved), and the rest of the area graveled, landscaped or re-vegetated. Fill quantities are not yet estimated, but it is expected that the cut and fill requirements will balance.

1.1.2 Existing Site Conditions

The existing site is located on a 12% slope with a gravelly loam soil. Currently, there are no buildings or equipment stored on the property. This parcel has primarily been used for grazing by cattle.

1.1.3 Adjacent Areas

A small portion of South Mountain to the north of the project site could potentially discharge stormwater onto the project site through an existing culvert, unless protective measures are taken. Therefore, the site will be graded such that storm water cannot enter from off site.

1.1.4 Critical Areas

There are some wetlands located to the south of the project site within the parcel owned by Moulding & Sons, Inc.. There are other wetlands associated with the Great Salt Lake that are located to the south of the railroad.

1.1.5 Soils

Information from the Natural Resources Conservation Service (NRCS) indicate that the area of the project site consists of a gravelly loam topsoil. The remainder of the parcel that the project site would be tributary to contains soils classified as Lakeshore. The Lakeshore series consists of very deep, poorly drained soils that formed in lacustrine deposits derived from mixed rocks. Lakeshore soils are on lake plains and lake terraces with slopes of 0 to 1 percent. The NRCS describes the areas with this type of soil as being prone to ponding because of the flatness and soil saturation during the spring.

1.1.6 Construction Phasing

1.1.6.1 Clearing and Grubbing - The first construction phase will consist of clearing the site of soils that are unsuitable for construction and grubbing the site of any remaining roots, stumps, and other undesireable materials.

1.1.6.2 Excavating and Grading – The second construction phase will consist of excavating and exporting excess material and importing structural material.

1.1.6.3 Facilities Construction – The third construction phase will consist of constructing and installing the planned facilities on the site.

1.1.7 Construction Schedule

Because the construction schedule is not firm at this time, the starting and ending dates of the construction phases are not provided. The following periods are best estimates of the durations of each construction phase.

1.1.7.1 Clearing and Grubbing – One Week

1.1.7.2 Grading – One Month

1.1.7.3 Facilities Construction – 3 Weeks

1.1.8 Financial/Ownership Responsibilities

Moulding & Sons, Inc. is the owner of the site with financial responsibility for liablility associated with erosion and sedimentation impacts.

1.1.9 Engineering Calculations

Design calculations for the sizing of storm water management facilities are provided in Appendix A.

2 INTRODUCTION

2.1 Storm water Pollution Prevention Plan Requirements

This SWPPP was developed consistent with the requirements of the Utah Pollutant Discharge Elimination System (UPDES) General Storm water Permit for Construction Activities (see Appendix B for a copy of the general permit). The primary consideration determining the adequacy of this SWPPP is compliance with State Surface Water Quality Standards [Utah Administrative Code R317-2-14 (water classifications 2B and 3D) – see Appendix C).

This SWPPP, properly implemented, should result in discharge of water from the construction site without significantly degrading the quality of the receiving waters.

2.2 Purpose

The purpose of this SWPPP is to:

- Describe best management practices (BMPs) to minimize erosion and sediment runoff at the site
- Identify, reduce, eliminate, or prevent the pollution of storm water
- Prevent violations of surface water quality or groundwater quality standards

2.3 SWPPP Organization

This SWPPP consists of a detailed narrative section and the appendices, which contain illustrations, maps, and drawings. The narrative section includes descriptions of potential pollution problems associated with site features, and then discusses the selection of specific pollution prevention BMPs to reduce or eliminate the threat of causing pollution during the actual construction project. The illustrations, maps, and drawings in the appendices show the site location, topography, sensitive environmental receptors, placement of BMPs, and BMP specifications, and performance expectations.

The narrative section of this SWPPP is organized in numbered sections around the 12 required elements of an SWPPP listed below:

1. Mark project clearing limits
2. Establishing the construction entrance(s)
3. Storm water detention
4. Selection and installation of sediment controls
5. Soil stabilization
6. Slope protection
7. Drain inlet protection
8. Storm water outlet protection
9. Chemical spill prevention and response
10. Site Storm water Treatment
11. BMP maintenance
12. Project management

In the narrative section, each of the above elements will be discussed in relation to the specific conditions at the development. BMPs for each element will be screened, resulting in selection of those BMPs deemed most appropriate for use.

Specifications and drawings (as-needed) of the selected BMPs are referenced at the end of each section and can be found in Appendix D.

3 CLEARING LIMITS

3.1 Site Plans

The Storm Water BMP Plan for the Earthwork Phases drawing shows any surface water in the area and placement of anticipated BMPs needed to comply with the intent of this SWPPP.

3.2 Marking Clearing Limits

Prior to beginning earth-disturbing activities, including clearing and grading, all clearing limits, easements, setbacks, sensitive areas and their buffers, trees and drainage courses will be clearly marked to prevent environmental damage both on and off site.

3.3 Special Consideration

There are no areas of special consideration related to this project site.

3.4 Selected BMPs

- BMP C101: Preserving Natural Vegetation
- BMP C102: Buffer Zones

4 CONSTRUCTION ACCESS

4.1 Site Access

The construction access is located off 900 South north of the project site.

4.2 Street Cleaning

Sediment that is accidentally transported onto 900 South from the construction site will be removed from the street surface when necessary. Sediment will be shoveled and/or swept from the street and disposed of in a manner, which prevents contamination with storm water or surface water (e.g., covered soil stockpile). In addition, a street sweeper may be used to maintain clean roads on an as-needed basis.

4.3 Wheel Wash

Based on site conditions and time of year, a temporary truck wheel wash station may be constructed to ensure control of sediment at the construction exit point. The wheel wash system (if needed) will be constructed on the site at a location just prior to where trucks leave the site access and enter the street. The system will consist of an asphalt-lined wash pond for immersing the truck tires as the truck drives through and a small settling pond for settling suspended sediment in wash water cycled out of the system. Wash water may be reused after settling, infiltrated onsite, or transported off site for disposal. Accumulated sediments will be collected periodically, stockpiled for dewatering, then reused onsite.

4.4 Selected BMPs

- BMP C105: Stabilized Construction Entrance
- BMP C106: Wheel Wash

5 STORM WATER RETENTION

5.1 Storm Water Retention Pond

Due to the topography of the site and the relatively small proposed area of disturbance, no storm water retention is required for this site. The small amount of runoff produced from a 10 year - 24 hour storm event from the disturbed 3 acre building site will be discharged onto flat, grassy terrain that will settle any resulting sediments. The amount of runoff from a 10 year - 24 hour storm event was calculated to be about 2,000 cubic feet.

5.2 Run-on Bypass

Clean storm water run-on will not be allowed to run onto the area of disturbance from the up-gradient, undisturbed portion of the site.

6 SEDIMENT CONTROLS

6.1 Site Sediment Control System

The generally flat topography of the project parcel and long runoff distance over undisturbed terrain will control sediment transport by allowing sediments to settle prior to reaching the discharge point at the culvert or the wetlands.

7 SOIL STABILIZATION

This section describes some of the stabilization and structural BMPs that will be implemented to minimize erosion and transport of sediment should they become a problem.

7.1 Soil Stabilization

The following soil stabilization BMPs will be implemented at this site according to Part IIID.2(a)(2) of the General Permit:

- **Soil Covering.** Disturbed soils can be stabilized by covering them with transparent plastic sheeting. Plastic sheeting can also be used as an emergency BMP to cover previously stabilized areas, which begin to erode. Loose straw and mulch covers may also be used.

- **Bonded Fiber Matrix Soil Treatment.** Disturbed soils can be stabilized by applying a slurry of fibers and bonding ingredients that cure to create a breathable, built-in-place, protective crust blanket. This blanket is designed to prevent both water and wind erosion. The slurry materials are totally biodegradable and harmless to fish, birds, plants, and animals.

  The standards and specifications of the proprietary product shown in Appendix D are for example only. Any product that is totally biodegradable and harmless to fish, birds, plants, and animals can be used that accomplishes the goal of soil stabilization.

- **Maintenance of Existing Vegetation.** Existing and new vegetation will be maintained to the maximum extent practicable to prevent the contamination of storm water with sediment.

7.2 Selected BMPs

- BMP C123: Plastic Covering
- Bonded Fiber Matrix Soil Treatment
- BMP C101: Preserving Natural Vegetation

8 SLOPE PROTECTION

8.1 General Practices

Cut and fill slopes on this project have been designed and will be constructed so as to minimize erosion. Soil types have been analyzed and considered for their potential to erode also. In addition, slope runoff velocities will be reduced by terracing, creating diversions, and surface contouring.

Any upslope drainage and uncontaminated run-on water from off-site will be intercepted at the top of the slope and diverted around the active construction area. Down slope flows will be allowed to dissipate over the flat grassy runout before reaching the wetlands or culvert outlet.

8.2 Selected BMPs

- BMP C130: Surface Roughening
- BMP C131: Gradient Terraces

9 DRAIN INLET PROTECTION

9.1 Existing Storm Drains

There are no existing storm drain inlets on this site.

9.2 Newly Constructed Storm Drains

There are no proposed storm drain inlets on this site.

10 STORM WATER OUTLET PROTECTION

10.1 Retention Pond Outlet

A retention pond is not required on this site, therefore outlet protection is unnecessary.

11 SPILL PREVENTION AND RESPONSE

Consistent with the general permit requirements, all potential pollutants other than sediment will be handled and disposed of in a manner that does not cause contamination of storm water. Non-sediment pollutants that may be present during construction activities include:

- Petroleum products including fuel, lubricants, hydraulic fluids, and form oils
- Polymer used for soil stabilization
- Water treatment chemicals (coagulant, acid, sodium bicarbonate)
- Concrete
- Paints
- Fertilizers

These materials, and other materials used during construction with the potential to impact storm water, will be stored, managed, used, and disposed of in a manner that minimizes the potential for releases to the environment and especially into storm water.

Emergency contacts for the project will be posted at the project office and are included in Appendix F.

11.1 General Materials Handling Practices

The following general practices will be used throughout the project to reduce the potential for spills.

- Potential pollutants will be stored and used in a manner consistent with the manufacturer's instructions in a secure location. To the extent practicable, material storage areas should not be located near storm drain inlets and should be equipped with covers, roofs, or secondary containment as needed to prevent storm water from contacting stored materials. Chemicals that are not compatible (such as sodium bicarbonate and hydrochloric acid) shall be stored in segregated areas so that spilled materials cannot combine and react.

- Materials disposal will be in accordance with the manufacturer's instructions and applicable local, state, and federal regulations.

- Materials no longer required for construction will be removed from the site as soon as practicable.

- Adequate garbage, construction waste, and sanitary waste handling and disposal facilities will be provided to the extent necessary to keep the site clear of obstruction and BMPs clear and functional.

11.2 Specific Materials Handling Practices

- All pollutants, including waste materials and demolition debris, that occur on-site during construction will be handled in a way that does not contaminate storm water.

- All chemicals including liquid products, petroleum products, water treatment chemicals, and wastes stored on site will be covered and contained and protected from vandalism.

- Maintenance and repair of all equipment and vehicles involving oil changes, hydraulic system drain down, de-greasing operations, fuel tank drain down and removal, and other activities which may result in the accidental release of contaminants, will be conducted under cover during wet weather and on an impervious surface to prevent the release of contaminants onto the ground. Materials spilled during maintenance operations will be cleaned up immediately and properly disposed of.

- Wheel wash water will be settled and discharged on site by infiltration. Wheel wash water will not be discharged to the storm water system or the storm water treatment system.

- Application of agricultural chemicals, including fertilizers and pesticides, will be conducted in a manner and at application rates that will not result in loss of chemical to storm water runoff. Manufacturers' recommendations will be followed for application rates and procedures.

- pH-modifying sources will be managed to prevent contamination of runoff and storm water collected on site. The most common sources of pH-modifying materials are bulk cement, cement kiln dust (CKD), fly ash, new concrete washing and curing waters, waste streams generated from concrete grinding and sawing, exposed aggregate processes, and concrete pumping and mixer washout waters.

11.3 Spill Response

The primary objective in responding to a spill is to quickly contain the material(s) and prevent or minimize their migration into storm water runoff and conveyance systems. If the release has impacted on-site storm water, it is critical to contain the released materials on site and prevent their release into receiving waters.

If a spill of pollutants threatens storm water at the site, the spill response procedures outlined below must be implemented in a timely manner to prevent the release of pollutants.

- The site superintendent will be notified immediately when a spill, or the threat of a spill, is observed. The superintendent will assess the situation and determine the appropriate response.

- If spills represent an imminent threat of entering the receiving waters, facility personnel will respond immediately to contain the release and notify the superintendent after the situation has been stabilized.

- Spill kits containing materials and equipment for spill response and cleanup will be maintained at the site if necessary. Each spill kit may contain:

  - Oil absorbent pads (one bale)

  - Oil absorbent booms (40 feet)

  - 55-gallon drums (2)

  - 9-mil plastic bags (10)

  - Personal protective equipment including gloves and goggles

- If an oil sheen is observed on surface water (e.g., settling ponds, detention pond, swales), absorbent pads and/or booms will be applied to contain and remove the oil. The source of the oil sheen will also be identified and removed or repaired as necessary to prevent further releases.

- The site superintendent, or his designee, will be responsible for completing the spill reporting form and for reporting the spill to the appropriate state or local agency (see Forms at the end of this section).

- Facility personnel with primary responsibility for spill response and cleanup will receive training from the site superintendent. This training will include identifying the location of spill kits and other spill response equipment and the use of spill response materials.

- Spill response equipment will be inspected and maintained as necessary to replace any materials used in spill response activities.

11.4 Notification

- In the event of a spill, make the appropriate notification(s) consistent with the table provided in Appendix F.

Spill Report Form

LOCATION:______________________________

		Date:____________ Time:____________

Regulatory agencies notified (date, time, person, agency, and how):________________

Material spilled:______________________________

Quantity spilled:______________________________

Source:______________________________

Cause:______________________________

Extent of injuries (if any):______________________________

Adverse environmental impact (if any):______________________________

Immediate remedial actions taken at time of spill:______________________________

Measures taken or planned to prevent recurrence:______________________________

Additional comments:______________________________

This report prepared by: ______________________________

(Signature)

____________________ ______________________________

12 STORM WATER TREATMENT

12.1 Storm Water Collection System

Construction will occur in phases as much as practicable to avoid unnecessarily exposing vegetated areas of the site. Clean storm water, generated from stabilized and undisturbed portions of the site, will be collected and conveyed to stabilized discharge areas whenever necessary to avoid contact with disturbed portions of the site. All conveyance and collection systems will be constructed consistent with State and local BMP requirements.

12.2 Sediment Traps

During construction and prior to the completion of the storm drainage system and detention basin, storm water will be conveyed onto the flat grassy terrain to the south of the project site.

13 BMP MAINTENANCE

All temporary and permanent erosion and sediment control BMPs will be maintained and repaired as needed to assure continued performance of their intended function. All maintenance and repair will be conducted in accordance with BMPs. Recommended BMP maintenance requirements are listed in Table 1 included in this section. Following Table 1 is a BMP Inspection Checklist for use in routine inspections of the construction site.

Any temporary erosion and sediment control BMPs needed during the project will be removed within 30 days after final site stabilization is achieved or after the temporary BMPs are no longer needed. Trapped sediment will be removed or stabilized on site. Disturbed soil areas resulting from removal of BMPs or vegetation will be permanently stabilized as soon as possible.

Table 1

BMP Maintenance and Inspection Schedule
(Source Control BMPs)

MOULDING & SONS, INC.
Ogden, Utah

BMP Designation	BMP Name	Recommended Maintenance	Recommended Schedule of Maintenance
C101	Preserving Natural Vegetation	Inspect flagged areas to make sure flagging has not been removed. If tree roots have been exposed or injured, recover and/or seal them.	Daily (Documented Weekly)
C102	Buffer Zones	Inspect the area frequently to make sure flagging remains in place and the area remains undisturbed.	Daily (Documented Weekly)
C105	Stabilized Construction Entrance and Tire Wash	Quarry spalls (or hog fuel) shall be added if the pad is no longer in accordance with the specifications. If the rock (or hog fuel) entrance is not working to keep streets clean, then install wheel wash, sweep streets, or wash streets if wash water can be collected.	Daily (Documented Weekly)
C106	Wheel Wash	Wheel wash water shall not be discharged into a storm drain or the site's storm water collection system. Use closed-loop recirculation, land application, or discharge to sanitary sewer (by permit).	Daily (Documented Weekly)
C123	Plastic Covering	Replace torn sheets and repair open seams. Replace deteriorated plastic sheets. Dispose of plastic when no longer needed.	Weekly
	Bonded Fiber Matrix Soil Treatment	Reapply treatment to redisturbed soils that will be exposed for more than 3 weeks.	Weekly
C130	Surface Roughening	Re-roughen any areas beginning to erode.	Weekly and following storms
C131	Gradient Terraces	Maintenance should be performed as needed.	Annually and following large storm events

BMP Inspection Form

Erosion Prevention

Inspector(s):________________________________Date:________________

Site Name and Location:____

Current Weather Conditions:_____________ Last 24 Hours:______________

BMP Designation	O.K	Not O.K.	BMP Condition, Corrective Action, General Notes
Preserving Natural Vegetation			
Buffer Zones			
Stabilized Construction Access			
Wheel Wash			
Plastic Covering			
Soil Treatment			
Surface Roughening			
Gradient Terraces			

14 PROJECT MANAGEMENT

Implementation and management of the environmental aspects of this project under the SWPPP are the responsibilities of Moulding & Sons, Inc.. Communication between all parties performing work on the site is essential for proper implementation of the SWPPP. All parties involved should all be familiar with the SWPPP and their responsibilities under the plan. To help delegate these responsibilities the following outline has been provided:

14.1 Phasing of Construction

The project has been planned at this point in three phases. The first construction phase will consist of clearing the site of soils that are unsuitable for construction and grubbing the site of any remaining roots, stumps, and other undesireable materials. The second construction phase will consist of excavating and exporting excess material and importing structural material. The third construction phase will consist of constructing and installing the planned facilities on the site.

14.2 Seasonal Work

While not seasonal, some construction activities may need to be postponed if scheduled during ongoing storm events. Activities such as grading and trenching in areas directly adjacent to the drainage basin during rainstorms may result in sediment-contaminated storm water reaching the outlet. This work would therefore be performed within a window of dry weather predicted on the basis of weather reports.

14.3 Training

Moulding & Sons, Inc. will provide on-site training to key personnel responsible for compliance with the SWPPP. Construction workers and others at the site will be given appropriate training information at the conclusion of site safety meetings or on an as-needed basis.

14.4 Pre-construction Conference

One or more pre-construction meetings will be held with an explicit agenda item addressing the SWPPP.

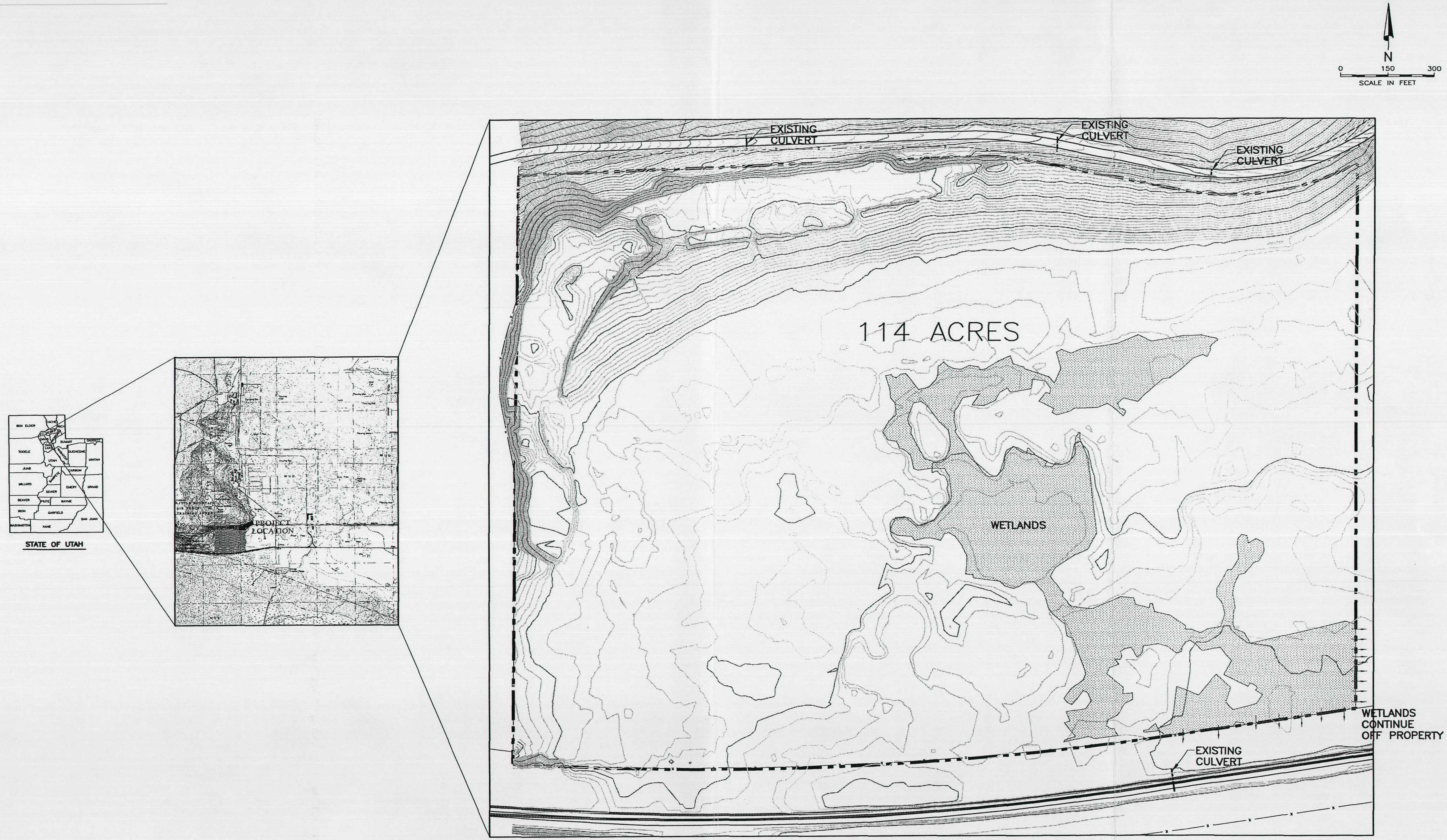
14.5 Coordination with Utilities and other Contractors

All contractors providing services on the project which may cause storm water pollution will be given a copy of the SWPPP and appropriate training regarding storm water pollution prevention.

14.6 Subcontractor Oversight

Subcontractor oversight to ensure compliance with the SWPPP will be provided by the prime contractor's superintendent or project manager. Informal, on-the-job tailgate training will be the first level of communication followed by onsite observation of training compliance. Non-compliance with SWPPP policies will trigger a more intensive training session to correct the problem(s). Chronic non-compliance with SWPPP policies may require the intervention of local and/or state regulatory personnel.

DRAWINGS



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HANSEN ALLEN & LUCE inc ENGINEERS

PROJECT ENGINEER	DESIGNED GLJ	3				SCALE
	DRAFTED CAH	2				
	CHECKED KCS	1				
	DATE JULY 2008	NO.	DATE	REVISIONS	BY	APVD.

MOULDING & SONS

COMMERCIAL SITE DEVELOPMENT
STORM WATER BMP PLAN
SITE BOUNDARY WITH TOPOGRAPHY

SHEET 1

333.01.100

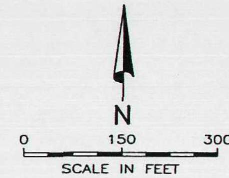
10/07

NOTES

1. THE IMPLEMENTATION OF THIS PLAN AND THE CONSTRUCTION, MAINTENANCE, REPLACEMENT, AND UPGRADING OF THESE FACILITIES IS THE RESPONSIBILITY OF THE APPLICANT/CONTRACTOR UNTIL ALL CONSTRUCTION IS COMPLETED AND APPROVED AND VEGETATION/LANDSCAPING IS ESTABLISHED.
2. THE BOUNDARIES OF THE CLEARING LIMITS SHOWN ON THIS PLAN SHALL BE CLEARLY FLAGGED IN THE FIELD PRIOR TO CONSTRUCTION. DURING THE CONSTRUCTION PERIOD, NO DISTURBANCE BEYOND THE FLAGGED CLEARING LIMITS SHALL BE PERMITTED. THE FLAGGING SHALL BE MAINTAINED BY THE APPLICANT/CONTRACTOR FOR THE DURATION OF CONSTRUCTION.
3. THE FACILITIES SHOWN ON THIS PLAN MUST BE CONSTRUCTED IN CONJUNCTION WITH ALL CLEARING AND GRADING ACTIVITIES, AND IN SUCH A MANNER AS TO MINIMIZE THE DISCHARGE OF SEDIMENT AND SEDIMENT-LADEN WATER FROM THE SITE
4. THE FACILITIES SHOWN ON THIS PLAN ARE THE MINIMUM REQUIREMENTS FOR ANTICIPATED SITE CONDITIONS. DURING THE CONSTRUCTION PERIOD, THESE FACILITIES SHALL BE UPGRADED AS NEEDED FOR UNEXPECTED STORM EVENTS AND TO MINIMIZE THE DISCHARGE OF SEDIMENT AND SEDIMENT-LADEN WATER FROM THE SITE.
5. THE FACILITIES SHALL BE INSPECTED ACCORDING TO THE SWPPP BY THE APPLICANT/CONTRACTOR AND MAINTAINED AS NECESSARY TO ENSURE THEIR CONTINUED FUNCTIONING.
6. THE FACILITIES ON INACTIVE SITES SHALL BE INSPECTED AND MAINTAINED A MINIMUM OF ONCE A WEEK OR WITHIN THE 48 HOURS FOLLOWING A MAJOR STORM EVENT.
7. AT NO TIME SHALL MORE THAN ONE FOOT OF SEDIMENT BE ALLOWED TO ACCUMULATE WITHIN A SEDIMENT TRAP ALL CATCH BASINS AND CONVEYANCE LINES SHALL BE CLEANED PRIOR TO PAVING. THE CLEANING OPERATION SHALL NOT FLUSH SEDIMENT LADEN WATER INTO THE DOWNSTREAM SYSTEM.
8. STABILIZED CONSTRUCTION ACCESS SHALL BE INSTALLED AT THE BEGINNING OF CONSTRUCTION AND MAINTAINED FOR THE DURATION OF THE PROJECT. ADDITIONAL MEASURES MAY BE REQUIRED TO ENSURE THAT ALL PAVED AREAS ARE KEPT CLEAN FOR THE DURATION OF THE PROJECT.

KEY TO BMP APPLICATIONS

C101 PRESERVING NATURAL VEGETATION
C102 BUFFER ZONE
C105 STABILIZED CONSTRUCTION ENTRANCE
C106 WHEEL WASH (IF NECESSARY)



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10/07

HANSEN ALLEN & LUCE inc ENGINEERS		DESIGNED GLJ	3				SCALE	MOULDING & SONS	COMMERCIAL SITE DEVELOPMENT STORM WATER BMP PLAN EARTHWORK PHASES / FACILITIES CONSTRUCTION PHASES
		DRAFTED CAH	2						SHEET 2
		CHECKED KCS	1						
	PROJECT ENGINEER	DATE JULY 2008	NO.	DATE	REVISIONS	BY / APVD.			333.01.100

APPENDIX A

ENGINEERING CALCULATIONS

Chapter 2 Estimating Runoff

SCS runoff curve number method

The SCS Runoff Curve Number (CN) method is described in detail in NEH-4 (SCS 1985). The SCS runoff equation is

$$Q = \frac{(P - I_a)^2}{(P - I_a) + S} \qquad \text{[eq. 2-1]}$$

where

Q = runoff (in)
P = rainfall (in)
S = potential maximum retention after runoff begins (in) and
I_a = initial abstraction (in)

Initial abstraction (I_a) is all losses before runoff begins. It includes water retained in surface depressions, water intercepted by vegetation, evaporation, and infiltration. I_a is highly variable but generally is correlated with soil and cover parameters. Through studies of many small agricultural watersheds, I_a was found to be approximated by the following empirical equation:

$$I_a = 0.2S \qquad \text{[eq. 2-2]}$$

By removing I_a as an independent parameter, this approximation allows use of a combination of S and P to produce a unique runoff amount. Substituting equation 2-2 into equation 2-1 gives:

$$Q = \frac{(P - 0.2S)^2}{(P + 0.8S)} \qquad \text{[eq. 2-3]}$$

S is related to the soil and cover conditions of the watershed through the CN. CN has a range of 0 to 100, and S is related to CN by:

$$S = \frac{1000}{CN} - 10 \qquad \text{[eq. 2-4]}$$

Figure 2-1 and table 2-1 solve equations 2-3 and 2-4 for a range of CN's and rainfall.

Factors considered in determining runoff curve numbers

The major factors that determine CN are the hydrologic soil group (HSG), cover type, treatment, hydrologic condition, and antecedent runoff condition (ARC). Another factor considered is whether impervious areas outlet directly to the drainage system (connected) or whether the flow spreads over pervious areas before entering the drainage system (unconnected). Figure 2-2 is provided to aid in selecting the appropriate figure or table for determining curve numbers.

CN's in table 2-2 (*a* to *d*) represent average antecedent runoff condition for urban, cultivated agricultural, other agricultural, and arid and semiarid rangeland uses. Table 2-2 assumes impervious areas are directly connected. The following sections explain how to determine CN's and how to modify them for urban conditions.

Hydrologic soil groups

Infiltration rates of soils vary widely and are affected by subsurface permeability as well as surface intake rates. Soils are classified into four HSG's (A, B, C, and D) according to their minimum infiltration rate, which is obtained for bare soil after prolonged wetting. Appendix A defines the four groups and provides a list of most of the soils in the United States and their group classification. The soils in the area of interest may be identified from a soil survey report, which can be obtained from local SCS offices or soil and water conservation district offices.

Most urban areas are only partially covered by impervious surfaces: the soil remains an important factor in runoff estimates. Urbanization has a greater effect on runoff in watersheds with soils having high infiltration rates (sands and gravels) than in watersheds predominantly of silts and clays, which generally have low infiltration rates.

Any disturbance of a soil profile can significantly change its infiltration characteristics. With urbanization, native soil profiles may be mixed or removed or fill material from other areas may be introduced. Therefore, a method based on soil texture is given in appendix A for determining the HSG classification for disturbed soils.

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

Utah 41.246455 N 112.232511 W 4202 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M. Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006

Extracted: Thu May 8 2008

Confidence Limits | Seasonality | Location Maps | Other Info. | GIS data | Maps | Help | Docs | U.S. Map

Precipitation Frequency Estimates (inches)																		
ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.12	0.18	0.23	0.31	0.38	0.48	0.55	0.73	0.92	1.12	1.29	1.47	1.70	1.87	2.34	2.78	3.37	3.96
2	0.15	0.23	0.29	0.39	0.48	0.60	0.68	0.89	1.12	1.37	1.58	1.81	2.08	2.30	2.88	3.42	4.14	4.86
5	0.21	0.32	0.40	0.53	0.66	0.78	0.86	1.09	1.36	1.66	1.91	2.18	2.51	2.77	3.44	4.07	4.90	5.74
10	0.26	0.40	0.50	0.67	0.83	0.95	1.02	1.27	1.57	1.90	2.18	2.49	2.86	3.13	3.87	4.57	5.47	6.41
25	0.35	0.53	0.66	0.89	1.10	1.23	1.29	1.54	1.88	2.23	2.54	2.90	3.33	3.62	4.42	5.20	6.18	7.23
50	0.43	0.66	0.81	1.10	1.36	1.49	1.54	1.76	2.13	2.47	2.82	3.23	3.69	3.98	4.80	5.65	6.67	7.81
100	0.53	0.80	0.99	1.34	1.66	1.80	1.84	2.02	2.40	2.73	3.10	3.57	4.05	4.34	5.18	6.08	7.12	8.35
200	0.64	0.98	1.21	1.63	2.02	2.17	2.20	2.32	2.69	2.98	3.39	3.91	4.41	4.69	5.53	6.49	7.53	8.83
500	0.83	1.26	1.56	2.10	2.60	2.76	2.78	2.90	3.16	3.33	3.77	4.37	4.88	5.13	5.95	6.99	7.99	9.39
1000	0.99	1.51	1.88	2.53	3.13	3.30	3.32	3.42	3.54	3.60	4.06	4.72	5.24	5.45	6.24	7.33	8.27	9.74

* These precipitation frequency estimates are based on a partial duration series. **ARI** is the Average Recurrence Interval
Please refer to the documentation for more information. NOTE: Formatting forces estimates near zero to appear as zero.

* Upper bound of the 90% confidence interval Precipitation Frequency Estimates (inches)																		
ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.14	0.21	0.27	0.36	0.44	0.54	0.62	0.80	1.00	1.25	1.43	1.63	1.88	2.06	2.56	3.03	3.65	4.29
2	0.18	0.27	0.34	0.45	0.56	0.68	0.77	0.99	1.23	1.54	1.77	2.00	2.31	2.54	3.15	3.73	4.48	5.26
5	0.24	0.37	0.46	0.62	0.77	0.88	0.97	1.20	1.49	1.86	2.13	2.41	2.79	3.04	3.77	4.43	5.28	6.19
10	0.31	0.47	0.58	0.78	0.96	1.08	1.16	1.40	1.72	2.13	2.42	2.76	3.17	3.44	4.24	4.96	5.89	6.90
25	0.41	0.62	0.77	1.04	1.29	1.41	1.47	1.71	2.07	2.49	2.83	3.22	3.69	3.98	4.83	5.65	6.64	7.78
50	0.51	0.78	0.96	1.29	1.60	1.73	1.76	1.97	2.37	2.78	3.14	3.60	4.09	4.38	5.25	6.14	7.17	8.41
100	0.63	0.96	1.19	1.60	1.98	2.12	2.15	2.29	2.70	3.06	3.47	3.98	4.50	4.78	5.67	6.63	7.67	9.01
200	0.78	1.19	1.47	1.98	2.46	2.61	2.61	2.67	3.07	3.36	3.80	4.38	4.92	5.17	6.06	7.10	8.11	9.53
500	1.03	1.57	1.95	2.62	3.25	3.42	3.46	3.49	3.69	3.76	4.25	4.93	5.49	5.69	6.55	7.67	8.63	10.16
1000	1.27	1.94	2.40	3.23	4.00	4.19	4.23	4.27	4.32	4.36	4.59	5.37	5.92	6.07	6.89	8.09	8.94	10.56

* The **upper** bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are **greater** than
** These precipitation frequency estimates are based on a partial duration series. **ARI** is the Average Recurrence Interval

Please refer to the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

* Lower bound of the 90% confidence interval Precipitation Frequency Estimates (inches)																		
ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.11	0.16	0.20	0.27	0.33	0.42	0.50	0.67	0.84	1.00	1.17	1.33	1.54	1.70	2.14	2.55	3.11	3.66
2	0.14	0.21	0.26	0.34	0.42	0.53	0.62	0.82	1.03	1.24	1.44	1.64	1.90	2.09	2.64	3.14	3.83	4.50
5	0.18	0.28	0.35	0.47	0.58	0.69	0.77	0.99	1.25	1.50	1.73	1.98	2.28	2.51	3.15	3.75	4.53	5.33
10	0.23	0.35	0.43	0.58	0.72	0.83	0.91	1.15	1.43	1.71	1.97	2.25	2.59	2.85	3.54	4.19	5.07	5.94
25	0.30	0.45	0.56	0.76	0.93	1.05	1.13	1.37	1.69	1.99	2.29	2.61	3.01	3.28	4.04	4.77	5.72	6.70
50	0.35	0.54	0.67	0.90	1.11	1.24	1.31	1.55	1.89	2.20	2.53	2.90	3.31	3.59	4.38	5.16	6.17	7.22
100	0.42	0.64	0.79	1.06	1.32	1.45	1.53	1.74	2.10	2.42	2.77	3.18	3.62	3.90	4.71	5.54	6.58	7.71

Water Features

Davis-Weber Area, Utah

[Depths of layers are in feet. See text for definitions of terms used in this table. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated. This report shows only the major soils in each map unit]

Map symbol and soil name	Hydrologic group	Surface runoff	Months	Water table		Ponding			Flooding	
				Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
				Ft	*Ft*	*Ft*				
BaE:										
Barton, gravelly loam	B	Medium	Jan-Dec			---	---	None	---	None
Barton, stony loam	B	Medium	Jan-Dec			---	---	None	---	None
Rock outcrop	---	---	Jan-Dec			---	---	None	---	None
BrG:										
Barton	B	High	Jan-Dec			---	---	None	---	None
Barton	B	High	Jan-Dec			---	---	None	---	None
Rock outcrop	---	---	Jan-Dec			---	---	None	---	None
GP:										
Gravel pits	---	---	Jan-Dec			---	---	None	---	None
La:										
Lakeshore	D	Negligible	January	0.0-1.7	>6.0	---	---	None	---	None
			February	0.0-1.7	>6.0	---	---	None	---	None
			March	0.0-1.7	>6.0	0.1-0.5	Long	Frequent	---	None
			April	0.0-1.7	>6.0	0.1-0.5	Long	Frequent	---	None
			May	0.0-1.7	>6.0	0.1-0.5	Long	Frequent	---	None
			June	0.0-1.7	>6.0	0.1-0.5	Long	Frequent	---	None
			July	0.0-1.7	>6.0	0.1-0.5	Long	Frequent	---	None
			August	0.0-1.7	>6.0	---	---	None	---	None
			September	0.0-1.7	>6.0	---	---	None	---	None
			October	0.0-1.7	>6.0	---	---	None	---	None
			November	0.0-1.7	>6.0	---	---	None	---	None
			December	0.0-1.7	>6.0	---	---	None	---	None

Established Series
Rev. AJE-TBN-MJD-JVC
02/2006

BARTON SERIES

The Barton series consists of very deep, well drained soils that formed in colluvium and residuum derived from metamorphic rocks. Barton soils are on hills. Slopes are 5 to 40 percent. The mean annual precipitation is about 15 inches and the mean annual temperature is about 50 degrees F.

TAXONOMIC CLASS: Coarse-loamy, mixed, superactive, mesic Typic Argixerolls

TYPICAL PEDON: Barton gravelly loam--rangeland. (Colors are for dry soil unless otherwise noted.)

A1--0 to 5 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; soft, friable, slightly sticky and nonplastic; few mica flakes; many fine roots; few fine pores; neutral (pH 6.8); clear smooth boundary. (3 to 6 inches thick)

A2--5 to 13 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; few mica flakes; many fine roots; common fine roots; common fine pores; neutral (pH 6.8); clear smooth boundary. (4 to 10 inches thick)

Bt--13 to 19 inches; dark grayish brown (10YR 4/2) gravelly loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few mica flakes; common fine roots; common fine pores; common thin clay films; neutral (pH 6.8); clear wavy boundary. (4 to 8 inches thick)

C1--19 to 31 inches; brown (10YR 5/3) very cobbly loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few mica flakes; few fine roots and few fine pores; neutral (pH 7.0); clear wavy boundary. (10 to 18 inches thick)

C2--31 to 60 inches; light brownish gray (10YR 6/2) very stony sandy loam, dark grayish brown (10YR 4/2) moist; single grain; neutral.

TYPE LOCATION: Weber County, Utah; on Little Mountain about 1 mile north of the gravel pit; about 1,000 feet west and 350 feet north from the center of section 7, T. 6 N., R. 3 W.

RANGE IN CHARACTERISTICS:

Mollic epipedon thickness - 10 to 19 inches; includes the Bt horizon in some pedons.

Particle-size control section - Clay content: 12 to 18 percent; Rock fragments: 20 to 35 percent, mainly gravel.

Depth to very cobbly or very stony material - 18 to 30 inches.

A1 horizon - Value: 3 or 4 dry, 2 or 3 moist.
Chroma: 2 or 3, dry or moist.
Organic matter content: 2 to 4 percent.
Texture: Gravelly loam, very gravelly loam, stony loam, or very stony loam.

A2 horizon - Value: 3 or 4 dry, 2 or 3 moist.
Chroma: 2 or 3, dry or moist.
Organic matter content: 1 to 3 percent.

Bt horizon - Value: 4 or 5 dry, 3 or 4 moist.
Texture: Gravelly loam or gravelly fine sandy loam.
Clay content: 12 to 18 percent.
Rock fragments: 20 to 35 percent.
Organic matter content: 0.5 to 1 percent.

C horizons - Hue: 10YR or 2.5Y.
Value: 5 or 6 dry, 4 or 5 moist.
Chroma: 2 or 3, dry or moist.
Texture: Very cobbly loam, very stony loam, very cobbly sandy loam, or very stony sandy loam.
Rock fragments: 35 to 60 percent.
Effervescence: Noneffervescent to strongly effervescent.

COMPETING SERIES: This is the Sorrell (T) series. Sorrell soils are moderately deep to paralithic contacts.

GEOGRAPHIC SETTING: Barton soils are on hills above the surrounding lake plain of Great Salt Lake. These soils formed in colluvium and residuum derived from metamorphic rocks such as tillite, fluvial conglomerate, varved slate, and graywacke. Slopes are 5 to 40 percent. The climate is dry subhumid. The mean annual precipitation is 13 to 16 inches. The mean annual temperature is 48 to 52 degrees F. and the mean summer temperature is 68 to 72 degrees F. The frost-free period is 140 to 160 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Leland, Saltair, and Warm Springs soils. Leland soils are fine-loamy, have ochric epipedons and natric horizons, and occur on lake terraces. Saltair soils are fine-silty, have ochric epipedons and salic horizons, and occur on lake plains. Warm Springs soils are fine-loamy, have calcic horizons, and occur on lake terraces.

DRAINAGE AND PERMEABILITY: Well drained; medium or high surface runoff; moderate permeability (moderately high or high saturated hydraulic conductivity).

USE AND VEGETATION: Barton soils are used as rangeland with part of the area used for industrial activities. The native vegetation is mainly Sandberg's bluegrass, threeawn grass, Wyoming big sagebrush, prairie junegrass, stork's bill, and sunflower.

DISTRIBUTION AND EXTENT: Northwestern Utah. These soils are not extensive with about 1,300 acres of the series mapped to date. MLRA 28A.

MLRA OFFICE RESPONSIBLE: Reno, Nevada.

SERIES ESTABLISHED: Weber County, Utah, 1974.

REMARKS: Diagnostic horizons and features recognized in this pedon are:

Mollic epipedon - The zone from the soil surface to 19 inches (A1, A2, and Bt horizon).

Argillic horizon - The zone from 13 to 19 inches (Bt horizon).

Particle-size control section - The zone from 13 to 19 inches (Bt horizon).

The superactive cation exchange activity class was added in 03/2003 to the taxonomic classification by the National Soil Survey Center on request of the Reno MLRA office, without review of the soil series property data.

ADDITIONAL DATA: The typical pedon at the series type location has partial characterization data by the Soils Laboratory from Utah State University (USU) Logan, UT and is published on pages 138-139, Table 11 of the Soil Survey of Davis-Weber Area, Utah. The pH values in the typical pedon are from the original field description.

National Cooperative Soil Survey
U.S.A.

LOCATION LAKESHORE UT

Established Series
Rev. AJE-MJD-RJL-JVC
03/2006

LAKESHORE SERIES

The Lakeshore series consists of very deep, poorly drained soils that formed in lacustrine deposits derived from mixed rocks. Lakeshore soils are on lake plains and lake terraces. Slopes are 0 to 1 percent. The mean annual precipitation is about 15 inches and the mean annual temperature is about 50 degrees F.

TAXONOMIC CLASS: Coarse-silty, mixed, superactive, mesic Typic Aquisalids

TYPICAL PEDON: Lakeshore silt loam--rangeland. (Colors are for moist soil unless otherwise noted.) The soil surface has a 3 millimeter thick salt crust.

Az--0 to 4 inches; grayish brown (2.5Y 5/2) silt loam, light gray (2.5Y 7/2) dry; weak medium platy structure; slightly hard, friable, slightly sticky and slightly plastic; many fine pores; violently effervescent; 16 percent calcium carbonate equivalent; strongly saline (EC 55 mmhos/cm); moderately alkaline (pH 8.1); clear smooth boundary. (2 to 5 inches thick)

Czg1--4 to 8 inches; light olive brown (2.5Y 5/3) silt loam, pale yellow (2.5Y 7/3) dry; massive; soft, very friable; slightly sticky and slightly plastic; many fine and medium pores; common medium prominent yellowish brown (10YR 5/6) masses of iron accumulation; violently effervescent; 19 percent calcium carbonate equivalent; strongly saline (EC 73 mmhos/cm); moderately alkaline (pH 8.0); clear smooth boundary. (3 to 15 inches thick.)

Czg2--8 to 13 inches; olive (5Y 5/3) very fine sandy loam, pale yellow (5Y 7/3) dry; massive; soft, very friable, nonsticky and nonplastic; common medium and fine pores; common fine prominent light olive brown (2.5Y 5/6) masses of iron accumulation; violently effervescent; moderately alkaline (pH 8.1); clear wavy boundary. (0 to 8 inches thick.)

Czg3--13 to 19 inches; olive (5Y 5/3) loam, pale yellow (5Y 7/3) dry; massive; slightly hard, very friable, slightly sticky and slightly plastic; common medium pores; common medium prominent light olive brown (2.5Y 5/6) masses of iron accumulation; violently effervescent; 11 percent calcium carbonate equivalent; strongly saline (EC 87 mmhos/cm); slightly alkaline (pH 7.7); clear smooth boundary. (4 to 11 inches thick.)

Czg4--19 to 51 inches; olive (5Y 5/3) silt loam, pale yellow (5Y 7/3) dry; massive; slightly hard, very friable, slightly sticky and slightly plastic; few fine and medium pores; common fine prominent light olive brown (2.5Y 5/6) masses of iron accumulation; violently effervescent; 10 percent calcium carbonate equivalent; strongly saline (EC 72 mmhos/cm); slightly alkaline (pH 7.7); clear wavy boundary. (12 to 20 inches thick.)

Czg5--51 to 64 inches; dark gray (5Y 4/1) silt loam, gray (5Y 6/1) dry; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine and medium pores; violently effervescent; 13 percent calcium carbonate equivalent; strongly saline (EC 72 mmhos/cm); neutral (pH 7.0).

TYPE LOCATION: Weber County, Utah; about 3 miles west of West Warren Church; approximately 1,320 feet east and 1,000 feet north of the southwest corner of section 17, T. 6 N., R. 3 W.; USGS Plain City SW 7.5 minute topographic quadrangle; 41 degrees 15 minutes 11 seconds north latitude and 112 degrees 12 minutes 49 seconds west longitude, NAD83; UTM zone 12N 398330E, 4567557N, NAD83.

RANGE IN CHARACTERISTICS:

Soil moisture - The soils are saturated with water during most of the year within a depth of 40 inches; the upper part of the moisture control section is dry during summer months in normal years; Aquic moisture regime during seasonal periods of saturation and reduction.

Mean annual soil temperature - 50 to 54 degrees F.

Particle-size control section - Clay content: Averages 8 to 18 percent.

Salinity - Surface is typically crusted with a thin layer of salt (mostly sodium chloride); salic horizon begins at the soil surface.

Az horizon - Hue: 2.5Y or 5Y.
Value: 4 or 5 moist, 6 or 7 dry.
Chroma: 1 or 2, dry or moist.
Texture: Silt loam or fine sandy loam.
Salinity (EC): 32 to 90 mmhos/cm.
Sodicity (SAR): 13 to 90.
Calcium carbonate equivalent: 5 to 25 percent.
Reaction: Slightly alkaline through strongly alkaline.

Czg horizons - Hue: 2.5Y or 5Y.
Value: 4 through 6 moist.
Chroma: 1 through 3, dry or moist.
Texture: Loam, silt loam, or very fine sandy loam.
Salinity (EC): 32 to 90 mmhos/cm.
Sodicity (SAR): 13 to 90.
Calcium carbonate equivalent: 5 to 25 percent.
Reaction: Neutral through strongly alkaline.

COMPETING SERIES: There are currently no other series in this family.

GEOGRAPHIC SETTING: Lakeshore soils are on lake plains and lake terraces adjoining small ponds. These soils formed in lacustrine deposits derived from mixed rocks such as limestone, quartzite, shale, and sandstone. Slopes are 0 to 1 percent. Elevations range from 4,200 to 4,400 feet. The climate is dry subhumid. The mean annual precipitation is 14 to 18 inches. The mean annual temperature is 48 to 52 degrees F., the mean summer temperature is 66 to 71 degrees F., and the frost-free period is 160 to 180 days.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Leland, Saltair, and Warm Springs soils. Leland soils are fine-loamy, have natric horizons, have seasonal high water tables at 30 to 48 inches in depth, and occur under alkali sacaton and black greasewood. Saltair soils are fine-silty. Warm

Springs soils are fine-loamy, have mollic epipedons and calcic horizons, and occur under alkali sacaton.

DRAINAGE AND PERMEABILITY: Poorly drained; negligible surface runoff; slow permeability (moderately low or moderately high saturated hydraulic conductivity). Endosaturation is present with an apparent seasonal high water table between the soil surface and 1.7 feet (very shallow and shallow free water occurrence classes) year-round. Cumulative annual duration class is Persistent. These soils are susceptible to occasional ponding for brief duration from March through July with water up to 6 inches deep.

USE AND VEGETATION: Lakeshore soils are used for rangeland and wildlife habitat. The soil surface is about 90 percent bare ground with some scattered vegetation that is usually inland saltgrass and pickleweed.

DISTRIBUTION AND EXTENT: Northwestern Utah. These soils are not extensive with about 9,400 acres of the series mapped to date. MLRA 28A.

MLRA OFFICE RESPONSIBLE: Reno, Nevada.

SERIES ESTABLISHED: Weber County (Davis-Weber Area), Utah, 1967.

REMARKS: Diagnostic horizons and features recognized in this pedon are:

Ochric epipedon - The zone from the soil surface to 4 inches (Az horizon).

Salic horizon - The zone from the soil surface to 64 inches (Az, Czg1, Czg2, Czg3, Czg4, and Czg5 horizons).

Aquic conditions - The conditions of endosaturation, reduction, and redoximorphic features between the soil surface and 20 inches at certain times during normal years (parts of the Az, Czg1, Czg2, Czg3, and Czg4 horizons).

Particle-size control section - The zone from 10 to 40 inches (Czg3 horizon and parts of the Czg2 and Czg4 horizons).

The soil was last reviewed in the field in 1965. It needs to be determined if the soil moisture control section is dry in some or all parts at some time during normal years. The height and duration of the seasonal high water needs to be verified in the field.

ADDITIONAL DATA: The typical pedon at the series type location has partial characterization data by the Soils Laboratory from Utah State University (USU) Logan, UT and is published on pages 140-141, Table 11 of the Soil Survey of Davis-Weber Area, Utah. The pH values in the typical pedon are from saturated paste.

National Cooperative Soil Survey
U.S.A.

HANSEN ALLEN & LUCE inc ENGINEERS

CLIENT Moulding & Sons
PROJECT Office Site - SWPPP
FEATURE Runoff Volume
PROJECT NO 333.01.100

SHEET ___ OF ___
COMPUTED ___
CHECKED ___
DATE ___

Runoff Volume for a 10 year - 24hr Storm

$$Q = \frac{(P-0.2S)^2}{(P+0.8S)}$$

where $S = \frac{1000}{CN} - 10 \Rightarrow CN = 69$ (TR-55, B-type soil, fair condition Pasture)

$$S = \frac{1000}{69} - 10 = 4.49$$

$P = 1.9$ in

$$Q = \frac{(1.9 - 0.2(4.49))^2}{(1.9 + 0.8(4.49))}$$

$= 0.18$ in

$A \approx 3$ acres

$$V = 0.18\ \cancel{in} \cdot \left(\frac{1\ ft}{12\ \cancel{in}}\right) \cdot 3\ acres$$

$= 0.045$ ac-ft or $1960\ ft^3$

APPENDIX B

NPDES STORM WATER PERMIT

utah gov | Online Services | Agency List | Business | Search

Utah Department of Environmental Quality - Division of Water Quality

Storm Water Permit Issuance System

Return to Start
Frequently Asked Questions
Feedback
DWQ Home Page

SUCCESS!

Thank you for applying for a Storm Water Permit online! Your payment has been accepted.

Storm Water Permit Number: UTR110683

Please print this page as a record of your permit coverage.

PERMIT INFORMATION

Permit Registration Date: 07/14/08
Permit Expiration Date: 07/17/09

PAYMENT INFORMATION

Payment Method: CREDIT CARD
Permit Application Fee: $100.00
Total Amount Paid: **$100.00**

SITE INFORMATION

Main Operator: Moulding & Sons
Contact Person: Randy Moulding
Contact Phone Number: 801 725-2722

Site Name: Office Site
Project Number (if any):
Street Address: 10500 W 900 S
County: WEBER
City, State, Zip: OGDEN, UT 84401
Latitude: 41.248317
Longitude: -112.231583

To view a printable version of your NOI application

Click Here

Return to Start

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STATE OF UTAH, DEPARTMENT OF ENVIRONMENTAL QUALITY, DIVISION OF WATER QUALITY
288 North 1460 West, P.O. Box 144870, Salt Lake City, Utah 84114-4870 (801)538-6146

NOI

Notice of Intent (NOI) for Storm Water Discharges Associated with **Construction Activity** Under the UPDES General Permit No. UTR110683

Submission of this Notice of Intent constitutes notice that the party(s) identified in Section I of this form intends to be authorized by UPDES General Permit No UTR110683 issued for storm water discharges associated with construction activity in the State of Utah. Becoming a permittee obligates such discharger to comply with the terms and conditions of the permit. ALL NECESSARY INFORMATION MUST BE PROVIDED ON THIS FORM.

I OPERATOR INFORMATION

Name (Main operator): Moulding & Sons Phone: 801 399-9994

Address: 910 West 21st Street Status of Owner/Operator: P - Private

City: Ogden State: UT Zip: 84401

Contact Person: Randy Moulding Phone: 801 725-2722

Name (1st Co-permittee): ______ Phone: ______

Address: ______ Status of Owner/Operator: ______

City: ______ State: ______ Zip: ______

Contact Person: ______ Phone: ______

Name (2nd Co-permittee): ______ Phone: ______

Address: ______ Status of Owner/Operator: ______

City: ______ State: ______ Zip: ______

Contact Person: ______ Phone: ______

Name (3rd Co-permittee): ______ Phone: ______

Address: ______ Status of Owner/Operator: ______

City: ______ State: ______ Zip: ______

Contact Person: ______ Phone: ______

Please copy this form if you have more co-permittees than what is allowed on this form.

II. FACILITY SITE / LOCATION INFORMATION

Is the facility located on Indian Lands? (Y or N) N

Name: Office Site

Project No. (if any): ______

Address: 10500 W 900 S County: WEBER

City: OGDEN State: UT Zip: 84401

Latitude: 41.248317 Longitude: -112.231583

III SITE ACTIVITY INFORMATION

Municipal Separate Storm Sewer System (MS4) Operator Name: ____________________

Receiving Water Body: ____________________

How far to the nearest water body? ____________

List the Number of any other UPDES permits at the site: ____________ ____________

IV TYPE OF CONSTRUCTION (Check all that apply)

1. ___ Residential 2. X Commercial 3. ___ Industrial 4. ___ Road 5. ___ Bridge 6. ___ Utility 7. ___ Contouring, Landscaping

8. ___ Other (Please list) ____________________

V MANAGEMENT PRACTICES

Identify proposed Best Management Practices (BMPs) to reduce pollutants in storm water discharges: (Check all that apply)

1. ___ Silt Fences 2. ___ Sediment Pond 3. X Seeding/Preservation of Vegetation 4. ___ Mulching/Geotextiles 5. ___ Check Dams 6. ___ Structural Controls (Berms, Ditches, etc.)

7. ___ Other (Please list) ____________________

VI. ADDITIONAL INFORMATION REQUIRED

Project Start Date:	Completion Date:	Estimated Area to be Disturbed
07/17/08	09/14/08	(in Acres): 3

A storm water pollution prevention plan has been prepared for this site and is to the best of my knowledge in Compliance with State and/or Local Sediment and Erosion Plans and Requirements.

(Y or N) Y (A pollution prevention plan is required to be on hand before submittal of the NOI)

VII CERTIFICATION:

I certify under penalty of law that I have read and understand the *Part I.B.* eligibility requirements for coverage under the general permit for storm water discharges from construction activities.

I further certify that to the best of my knowledge, all discharges and BMPs that have been scheduled and detailed in a pollution prevention plan will satisfy requirements of *Part I.B.*, and *Part III.* of this permit

I understand that continued coverage under this storm water general permit is contingent upon maintaining eligibility as provided for in *Part I.B.*

I also certify under penalty of law that this document and all attachments were prepared under the direction or supervision of those who have place their signature below, in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature: Certification provided online by Randy Moulding, President, kstaheli@hansenallenluce.com 07/14/08

Amount of Permit Fee Enclosed: $ 100

INSTRUCTIONS

Notice Of Intent (NOI) For Covered Under the UPDES General Permit
Storm Water Discharges From Construction Activities

Who Must File A Notice Of Intent (NOI) Form

State law at UAC R317-8-3.8 prohibits point source discharges of storm water from construction activities to a water body(ies) of the State without a Utah Pollutant Discharge Elimination System (UPDES) permit. The operator of a construction activity that has such a storm water discharge must submit a NOI to obtain coverage under the UPDES Storm Water General Permit. If you have questions about whether you need a permit under the UPDES Storm Water program, or if you need information as to whether a particular program is administered by EPA or a state agency, contact the storm water coordinator at (801) 538-6146.

Where To File NOI Form

NOIs, with fee payment(s), must be sent to the following address:

Department of Environmental Quality
Division of Water Quality
P.O. Box 144870
Salt Lake City, UT 84114-4870

Completing The NOI Form

You must type or print, using upper-case letters, in the appropriate areas only. Please place each character between the marks. Abbreviate if necessary to stay within the number of characters allowed for each item. Use one space for breaks between words, but not for punctuation marks unless they are needed to clarify your response. If you have any questions on this form please call the storm water coordinator at (801) 538-6146.

Beginning of Coverage

Storm Water General Permits cover a facility quickly avoiding delays, therefore coverage is immediate after NOI with submission of the permit fee. The permittee should be aware that though you may not have a permit in hand, if you have sent in a completed NOI with the permit fee you are covered by the conditions in the permit and will be expected to comply with these conditions. If you wish, contact the Division of Water Quality at (801) 538-6146 to receive a generic copy of the permit. After we receive the NOI and the permit fee we will send you an official copy of the permit with your permit number.

Permit Fees (*MAKE CHECKS PAYABLE TO: DIVISION OF WATER QUALITY*)

Construction projects are prorated from the time they begin disturbing ground until the time the disturbed surface is stabilized, and the permit is terminated by the permittee with a submittal of a Notice of Termination (NOT) form. Fees are prorated at $8.34 per month of coverage needed, except a $50 minimum and a $500.00 maximum. **EXAMPLE: if you need 5 months of coverage: 5 x $8.34 = $41.70, then you will need to submit the $50 minimum, if 18 months of coverage is needed: 18 x $8.34 = $150.12, your total fee will be $150.12.** The $500.00 maximum will provide permit coverage for five years and then expire at the end of the five year period. State or local political subdivisions are exempt from the permit fee. The fee must be received with the NOI before permit coverage is given.

General

Facilities within Salt Lake City or Salt Lake County must contact the city or county and notify them of the new permit status for the facility.

SECTION I - FACILITY OPERATOR INFORMATION

Give the legal name(s) of the person(s), firm(s), public organization(s), or any other entity(ies) that conducts the construction operation at the facility or site described in this application. The name of the operator(s) may be the developer, the owner, the general contractor, the design firm, the excavation contractor and/or others (e.g. anyone that fits the definition of operator). An operator is anyone that has control over site/project specifications and/or control of day to day operational activities. Do not use a colloquial name. Enter the complete address and telephone number of the operator(s).

Enter the appropriate letter to indicate the legal status of the operator of the facility.
F = Federal **M** = Public (other than Fed or State) **S** = State **P** = Private

SECTION II - FACILITY/SITE LOCATION INFORMATION

Enter the facility's or site's official or legal name and project number (if any) and complete street address, including city, state and ZIP code. If the facility or site lacks a street address, indicate the latitude and longitude of the facility to the nearest 15 seconds of the approximate center of the site.

Indicate whether the facility is located on Indian Lands.

If the facility is located on Indian Lands EPA form 3510-6 should be used and submitted to EPA Region VIII except for facilities on the Navajo Reservation or on the Goshute Reservation which should submit EPA form 3510-6 to Region IX.

SECTION III - SITE ACTIVITY INFORMATION

If the storm water discharges to a municipal separate storm sewer system (MS4), enter the name of the operator of the MS4 (e.g., municipality name, county name) <u>and</u> the receiving water of the discharge from the MS4 if it is known. (A MS4 is defined as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) that is owned or operated by a state, city, town, county, district, association or other public body which is designed or used for collecting or conveying storm water).

SECTION IV - TYPE OF CONSTRUCTION

Check each type of construction that applies to this application.

SECTION V - MANAGEMENT PRACTICES

Check each type of management practices that will be used to control storm water runoff at the job site.

SECTION VI - ADDITIONAL INFORMATION REQUIRED

Enter the project start date and the estimated completion date for the entire development plan.

Provide an estimate of the total number of acres of the site on which soil will be disturbed (round to the nearest acre).

Indicate whether the storm water pollution prevention plan for the site is in compliance with approved state and/or local sediment and erosion plans, permits, or storm water management plans.

SECTION VII - CERTIFICATION

State statutes provide for severe penalties for submitting false information on this application form. State regulations require this application to be signed as follows.

For a corporation: by a responsible corporate officer, which means: (i) president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions, or (ii) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

For a partnership or sole proprietorship: by a general partner or the proprietor; or

For a municipality, state, Federal, or other public facility: by either a principal executive officer or ranking elected official.

POLLUTION PREVENTION PLAN

A storm water pollution prevention plan (SWP3) is required to be in hand before the NOI can be submitted. It is important to know SWP3 requirements (contained in the permit) even during the design portion of the project. A copy of the permit can be obtained from the Division of Water Quality. Guidance material for developing a SWP3 can be obtained from EPA (NTIS) or copied from EPA material at the Division of Water Quality.

NOTICE OF TERMINATION (NOT)

A completed Notice of Termination (NOT) form is required to terminate your permit at the end of construction. Please complete the NOT form, including the project's assigned permit number, and return it to the Division of Water Quality. Please contact the storm water coordinator at (801) 538-6146 for any questions or for a copy of the NOT form.

10/30/97

STATE OF UTAH DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF WATER QUALITY

Authorization to Discharge Under the
Utah Pollutant Discharge Elimination System

Storm Water General Permit for
Construction Activities
Permit No. UTR300000

This Permit is issued in compliance with the provisions of the Utah Water Quality Act, Title 19, Chapter 5, Utah Code Annotated 2004, as amended (the "Act") and the federal Water Pollution Control Act (33 U.S.C. §§ 1251 *et. seq.*, as amended to date), and the rules and Regulations made pursuant to those statutes.

This Permit authorizes storm water discharges to waters of the State of Utah resulting from construction activities, including construction support activities, anywhere within the State of Utah as provided in Parts 1.4 and 1.5 of this Permit. This authorization is conditioned upon a discharger meeting the eligibility requirements in Part 1.2.2 of this Permit, including preparation of a Storm Water Pollution Prevention Plan prior to filing a Notice of Intent ("NOI") to discharge under this General Permit. A discharger is not covered by this Permit if the discharger submits an NOI but has not met these conditions.

This authorization is subject to the authority of the Utah Water Quality Board or the Executive Secretary of the Utah Water Quality Board to reopen this Permit (*see* Part 5.15 of this Permit), or to require a discharger to obtain an individual permit or use an alternative general permit (*see* Part 2.3 of this Permit). The issuance of a discharge permit authorization under this general Permit does not relieve Permittees of other duties and responsibilities under the Act or rules made under that Act. Significant terms used in this Permit are defined in Part 6 of this Permit.

This Permit shall become effective on July 1, 2008.

This Permit and the authorization to discharge shall expire at midnight, June 30, 2013, except as described in Part 2.4 of this Permit.

Signed this 26th day of June, 2008.

Walter L. Baker, P.E.
Executive Secretary,
Utah Water Quality Board

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PART 1: PERMIT SCOPE AND COVERAGE

1.1 Persons required to obtain authorization for discharge. No person may conduct construction activities that disturb an area greater than or equal to one acre without authorization for storm water discharge from the Executive Secretary. (*See* Utah Admin. Code Sections R317-8-3.9(6)(d)(10) and R317-8-3.9(6)(e)(1).) In addition, no person may conduct construction activities that disturb an area smaller than one acre if the disturbance is part of a larger common plan of development or sale that will ultimately disturb an area greater than or equal to one acre. *Id.* *See* Part 6.5 of this Permit for a definition of "construction activities."

1.2 Permit Area and Eligibility.

1.2.1. Construction activities located within the State of Utah, except for Indian Country (*see* Part 6.16 of this Permit for a definition of "Indian Country") may be eligible to be covered under this Permit.

1.2.2. Eligibility for authorization to discharge under this Permit is conditioned upon:

a. Preparation of a Storm Water Pollution Prevention Plan ("SWPPP") (see Part 3 of this permit) prior to submission of a Notice of Intent ("NOI");

b. Submission of a complete and a ccurate Notice of Intent to be covered by this Permit (see Part 1.8 of this Permit); and

c. Payment of applicable fees.

1.3 Authorization to Discharge. This Permit authorizes discharges of storm water from construction activities that disturb an area greater than or equal to one acre, and from construction activities that disturb an area smaller than one acre if the disturbance is part of a larger common plan of development or sale that will ultimately disturb an area greater than or equal to one acre. This authorization is subject to all of the terms and conditions of this Permit, including the requirement that the discharger must submit a Notice of Intent ("NOI"), and the prohibitions on discharges specified in Part 1.6.

1.4 Allowable Storm Water Discharges. Subject to compliance with the terms and conditions of this Permit, a Permittee is authorized to discharge pollutants in:

1.4.1. Storm water associated with construction activity as that term is defined in Part 6.5 of this Permit (but see Part 1.4.3 of this Permit for limitations on discharges from construction support activities);

1.4.2. Storm water discharges designated by the Executive Secretary as needing a storm water permit under R317-8-3.9(6)(e)(2);

1.4.3. Discharges from construction support activities as that term is defined in Part 6.6 of this Permit, provided:

a. The support activity is directly related to the construction site required to have UPDES permit coverage for discharges of storm water associated with construction activity;

b. The support activity is not a commercial operation serving multiple unrelated construction projects by different owners/operators, and does not operate beyond the completion of the construction activity at the last construction project it supports; and

c. Appropriate controls and measures are identified in a Storm Water Pollution

Prevention Plan (SWPPP) covering the discharges from the support activity areas; and

1.4.4. Discharges composed of allowable discharges listed in Part 1.4 and 1.5 of this Permit commingled with a discharge authorized by a different UPDES permit and/or a discharge that does not require UPDES permit authorization.

1.5. Allowable Non-storm Water Discharges. A Permittee is authorized to make the following non-storm water discharges, provided the non-storm water component of the discharge is in compliance with Part 3.5.5 of this Permit:

1.5.1. Discharges from fire-fighting activities;
1.5.2. Fire hydrant flushings;
1.5.3. Waters used to wash vehicles where detergents are not used;
1.5.4. Water used to control dust in accordance with Part 3.5.2(c)(2);
1.5.5. Potable water including uncontaminated water line flushings;
1.5.6. Routine external building wash down that does not use detergents;
1.5.7. Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used;
1.5.8. Uncontaminated air conditioning or compressor condensate;
1.5.9. Uncontaminated ground water or spring water;
1.5.10. Foundation or footing drains where flows are not contaminated with process materials such as solvents;
1.5.11. Landscape and other irrigation drainage.

1.6 Discharges not allowed under this Permit. Notwithstanding any other language in this Permit, the following storm water discharges are not authorized by this Permit:

1.6.1. Discharges from Construction Activities within Indian Country. This Permit does not cover discharges within Indian Country as that term is defined in Part 6.16 of this Permit;[1]
1.6.2. Post Construction Discharges. Storm water discharges that originate from the site after construction activities have been completed and the site has undergone final stabilization;
1.6.3. Discharges Mixed with Non-storm Water. Discharges that are mixed with sources of non-storm water other than discharges which are identified in Part 1.5 of this Permit and in compliance with Part 3.5.5 (non-storm water discharges) of this Permit;
1.6.4. Discharges Covered by Another Permit. Storm water discharges associated with construction activity for which an individual permit has been issued, or for which the owner/operator is required to or may obtain coverage under an individual permit or an alternative general permit (*see* Part 2.3 of this Permit), including a general

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[1] The State of Utah, *Division of Water Quality*, does not have permit authority for Indian Country. Storm water permits for Indian Country within the State must be acquired through EPA Region VIII, except for facilities on the Navajo Reservation or on the Goshute Reservation which must acquire storm water permits through EPA Region IX.

permit issued for areas regulated by a qualified municipal Separate Storm Sewer System Program;

1.6.5. Discharges Threatening Water Quality. Storm water discharges from construction activities that cause or have the reasonable potential to cause a violation of a water quality standard. *See* Part 2.2 of this Permit;

1.6.6. Discharges from commercial construction support and related activities. Storm water discharges from construction support activities unless they are included within the definition in Part 6.6 of this permit;

1.6.7. Spills. This Permit does not authorize the discharge of hazardous substances or oil resulting from an on-site spill; and

1.6.8. Discharges that result from violations of this Permit.

1.7 Authorization to Discharge Date.

1.7.1. This permit is effective as of July 1, 2008 and is effective for five years, expiring at 11:59 p.m. on June 30, 2013.

1.7.2. Unless notified by the Executive Secretary to the contrary, a discharger is authorized for coverage under this Permit and may begin construction activities immediately after preparing a SWPPP for the construction activities (*see* Part 1.2.2(a) of this Permit), and after submitting an NOI and permit fee (*see* Part 1.2.2(b) and (c) of this Permit). The date of submission of the NOI or a permit fee shall be the date of its receipt by the Executive Secretary, or the date the NOI or permit fee are submitted electronically using the website for the Utah Division of Water Quality. Any NOIs mailed to the Executive Secretary shall be mailed to the address specified in Part 5.11 of this Permit.

1.7.3. The Executive Secretary may, with written notice (including electronic notice) delay authorization to verify an applicant's eligibility or resolve other concerns. In these instances, a discharger is not authorized for coverage under this permit until it receives notice from the Executive Secretary.

1.8 Notice of Intent

1.8.1. A person who wishes to submit an NOI must use the NOI form provided by the Executive Secretary (or a copy thereof), or submit an NOI electronically (see (https://secure.utah.gov/stormwater/)).

1.8.2. All questions in an NOI form provided by the Executive Secretary or answered in the course of submitting an NOI electronically must be answered completely and accurately.

1.8.3. The NOI, whether on the form provided by the Executive Secretary or submitted electronically, must include a certification statement, and must be signed and dated by an authorized representative as specified in Part 5.16 of this Permit.

1.9 Coverage before June 30, 2010. Permittee's that previously received authorization to discharge under the October 1, 2002 General Permit (2002 General Permit) and still have active coverage shall without submission of an NOI continue coverage under UTR200000 until June 30, 2010 at which time, or before if desired, the Permittee shall, by submission of an NOI (either on-line www.waterquality.utah.gov/updes/stormwatercon.htm or by paper submission) obtain coverage under this Permit (UTR300000).

1.10 Late Notifications. Persons are not prohibited from submitting NOIs after initiating clearing, grading, excavation activities, or other construction activities. When a late NOI is submitted, authorization for discharges occurs consistent with Subpart 2.1. The Agency reserves the right to take enforcement action for any un-permitted discharges that occur between the commencement of construction and discharge authorization.

PART 2. SPECIAL CONDITIONS, MANAGEMENT PRACTICES, RESPONSIBILITIES, AND OTHER NON-NUMERIC LIMITATIONS

2.1 Releases in excess of Reportable Quantities. The discharge of hazardous substances or oil in the storm water discharge(s) from a site shall be prevented or minimized in accordance with the applicable SWPPP for the site. This Permit does not relieve the Permittee of the reporting requirements of 40 CFR part 117, 40 CFR 110, and 40 CFR part 302. Where a release containing a hazardous substance in an amount equal to or in excess of a reportable quantity established under either 40 CFR 117, 40 CFR 110, or 40 CFR 302, occurs during a 24 hour period:

2.1.1. The Permittee is required to notify the National Response Center (NRC) (800-424-8802) in accordance with the requirements of 40 CFR 117, 40 CFR 110, and 40 CFR 302 and the Division of Water Quality (DWQ) (801-538-6146) or the 24 hour DWQ answering service at 801-536-4123 as soon as he or she has knowledge of the discharge;

2.1.2. The Permittee shall submit within 14 calendar days of knowledge of the release a written description of: the release (including the type and estimate of the amount of material released), the date that such release occurred, the circumstances leading to the release, the measures taken and/or planned to be taken to cleanup the release, and steps to be taken to minimize the chance of future occurrences to the Executive Secretary; and

2.1.3. The SWPPP required under Part 3 of this Permit must be modified within 14 calendar days of knowledge of the release to provide a description of the release, the circumstances leading to the release, and the date of the release. In addition, the SWPPP must be reviewed to identify measures to prevent the reoccurrence of such releases and to respond to such releases, and the SWPPP must be modified where appropriate.

2.2 Discharge Compliance with Water Quality Standards and TMDL requirements.
Storm water discharges from construction activities that cause or have the reasonable potential to cause a violation of a water quality standard or a violation of Total Maximum Daily Load ("TMDL") requirements are not authorized by this Permit. If there is a TMDL requirement for the receiving water, that requirement, rather than a water quality standard, will govern. If a discharge that would otherwise be covered by this Permit causes a violation or if there is a reasonable potential a discharge will cause a violation, the Permitteee will take all necessary actions to ensure future discharges do not cause or contribute to the violation of a water quality standard or a TMDL requirement, and shall document these actions in the SWPPP.

If the Executive Secretary determines that construction activities have caused or have the reasonable potential to cause a violation of a water quality standard or a TMDL requirement, the discharger will be notified by the Executive Secretary of additional requirements for treatment or handling of the discharge to ensure future discharges do not cause or contribute to the violation. The Permittee will document these requirements in the SWPPP. The Executive Secretary may authorize continued coverage under this Permit after appropriate controls and implementation procedures, designed to bring the discharges into compliance with water quality standards or TMDL requirements, have been included in the SWPPP.

Alternatively, the Executive Secretary may notify the Permittee that an individual permit application is necessary (see Part 2.3 of this Permit).

If violations remain or re-occur, then coverage under this Permit may be terminated by the Executive Secretary and an alternative permit may be issued or denied. Compliance with this requirement does not preclude any enforcement activity as provided by the Water Quality Act for the underlying violation.

2.3 Requiring an Individual Permit or an Alternative General Permit.

2.3.1. The Executive Secretary may require any person authorized by this Permit to apply for and/or obtain either an individual UPDES permit or an alternative UPDES general permit. Any interested person may petition the Executive Secretary to take action under this paragraph. Where the Executive Secretary requires a discharger authorized to discharge under this Permit to apply for an individual UPDES permit, the Executive Secretary shall notify the discharger in writing that a permit application is required. This notification shall include a brief statement of the reasons for this decision, an application form or reference to the application requirements, a statement setting a deadline for the discharger to file the application, and a statement that on the effective date of issuance or denial of the individual UPDES permit or the alternative general permit as it applies to the individual Permittee, coverage under this general Permit shall automatically terminate. Applications shall be submitted to the address of the Division of Water Quality shown in Part 5.11 of this Permit. The Executive Secretary may grant additional time to submit the application upon request of the applicant. If a discharger fails to submit in a timely manner an individual UPDES permit application as required by the Executive Secretary under this paragraph, then the applicability of this Permit to the individual UPDES permittee is automatically terminated at the end of the day specified for application submittal.

2.3.2. Any discharger authorized by this Permit may request to be excluded from the coverage of this Permit by applying for an individual permit. In such cases, the discharger shall submit an individual application in accordance with the requirements of Utah Administrative Code ("UAC") R317-8-3.9(2)(b)2 with reasons supporting the request, to the Executive Secretary at the address for the Division of Water Quality in Part 5.11 of this Permit. The request may be granted by issuance of any individual permit or an alternative general permit if the reasons cited by the Permittee are adequate to support the request.

2.3.3. When an individual UPDES permit is issued to a discharger who would otherwise be subject to this Permit, or the discharger is authorized to discharge under an alternative UPDES general permit, the applicability of this Permit to the individual UPDES permittee is automatically terminated on the effective date of the individual permit or the date of authorization for coverage under the alternative general permit, whichever the case may be. When an individual UPDES permit is denied to a discharger otherwise subject to this Permit or the discharger is denied for coverage under an alternative UPDES general permit, the applicability of this Permit to the individual UPDES permittee is automatically terminated on the date of such denial, unless otherwise specified by the Executive Secretary.

2.4 Continuation of the Expired General Permit. This Permit expires on June 30, 2013. However, an expired general permit shall continue in force and effect after the expiration date until a new general permit is issued. If a discharger was eligible for and permitted under this Permit, and this Permit expires, the discharger will remain covered by this Permit until the earliest of:

2.4.1. One hundred twenty days after re-issuance or replacement of this Permit;
2.4.2. The discharger submits a Notice of Termination in compliance with this Permit;
2.4.3. The discharger is issued an individual permit for the project's discharges; or
2.4.4. 180 days after the Executive Secretary makes a formal decision not to reissue or replace this Permit, at which time the discharger must seek coverage under an alternative general permit or an individual permit.

PART 3. STORM WATER POLLUTION PREVENTION PLANS

3.1. SWPPP required. A Storm Water Pollution Prevention Plan ("SWPPP") shall be developed for each construction project covered by this Permit prior to submission of an NOI. A SWPPP shall be prepared in accordance with good engineering practices. It is recommended that the plan be signed by a Professional Engineer (P.E.) registered in the State. The SWPPP shall identify potential sources of pollution which may reasonably be expected to affect the quality of storm water discharges from the construction site, shall describe and ensure the implementation of practices which will be used to reduce the pollutants in storm water discharges associated with construction activity at the construction site and to assure compliance with the terms and conditions of this Permit, and shall otherwise meet the requirements of this Permit. As a condition of this Permit, Permittees must implement the SWPPP as written or modified from commencement of construction until final stabilization is complete and an NOT has been submitted. (This provision is not intended to address the potential liability of a Permittee or other current or former operator or owner in the event of a discharge of pollution from the property of an individual homeowner.)

3.2. SWPPP Location, Availability, Revision, and Signature.

3.2.1. SWPPP Location. A copy of the SWPPP, including a copy of the Permit, the NOI, and any amendments to the SWPPP, shall be retained on-site at the site which generates the storm water discharge in accordance with this Part 3.2 and with Part 5.10 of this Permit. If the site is inactive or does not have an onsite location adequate to store the copy of the SWPPP, reasonable local access to a copy of the SWPPP during normal working hours (e.g., at a local library or government building), must be provided and the location of the SWPPP, along with a contact phone number, shall be posted on site at a publicly-accessible location. For linear construction projects, such as pipelines, the posted notice shall be located at a publicly accessible location near the active part of the construction project.

3.2.2. SWPPP Availability. The Permittee shall make the copy of the SWPPP that is kept on-site or kept locally available for review upon request to the Executive Secretary; EPA; other local agencies approving sediment and erosion plans, grading plans, or storm water management plans; local government officials; or to the operators of a municipal separate storm sewer receiving discharges from the site. The Permittee need not provide a free copy of the SWPPP to these entities upon request, but if it chooses not to do so, it shall keep two copies of the SWPPP, in its entirety, and shall allow these entities to borrow one to make a copy at their own expense.

3.2.3. Original SWPPP. If requested by the Executive Secretary, the original SWPPP, including any previous versions requested, shall be provided to the Executive Secretary within five working days of the request. The original provided shall be signed in accordance with Part 5.16 of this Permit.

3.2.4. SWPPP Availability to the Public. The Permittee shall also make a copy of the SWPPP available to the public to review at reasonable times during regular business hours. Advance notice by the public of the desire to view the SWPPP may be required, not to exceed two working days. The Permittee need not provide a free copy of the SWPPP to members of the public, but if it chooses not to do so, it shall keep two copies of the SWPPP, in its entirety, and shall allow members of the public to borrow one to make a copy at their own expense.

3.2.5. Compelled Revisions. The Executive Secretary, or an authorized representative of the Executive Secretary, may notify the Permittee (co-Permittees) at any time that the SWPPP does not meet one or more of the minimum requirements of this Part 3. Such notification shall identify those provisions of the Permit which are not being met by the SWPPP, and identify which provisions of the SWPPP require modifications in order to meet the minimum requirements of this Part 3. Within 7 days of such notification from the Executive Secretary, (or as otherwise provided by the Executive Secretary), or authorized representative, the Permittee shall make the required changes to the SWPPP and shall submit to the Executive Secretary a written certification that the changes have been made. The Executive Secretary may take appropriate enforcement action for the period of time the Permittee was operating under a SWPPP that did not meet the minimum requirements of the Permit.

3.2.6. All SWPPPs must be signed and certified in accordance with Part 5.16 of this Permit.

3.3. Keeping SWPPPs Current.

3.3.1. The Permittee shall amend the SWPPP whenever there is a change in design, construction, operation, or maintenance, which has a significant effect on the discharge of pollutants to the waters of the State and which has not otherwise been addressed in the SWPPP.

3.3.2. The Permittee shall amend the SWPPP whenever inspections or investigations by site operators, local, state, or federal officials indicate the SWPPP is proving ineffective in eliminating or significantly minimizing pollutants from sources identified under Part 3.5.1 of this Permit, or is otherwise not achieving the general objectives of controlling pollutants in storm water discharges associated with construction activity.

3.3.3. The Permittee shall amend the SWPPP whenever a new owner/operator becomes responsible for implementing all or part of the SWPPP, as further described in Part 3.4 and Part 4.3 of this Permit.

3.3.4. The following records of activities shall be maintained as part of the SWPPP:
  a. Dates when major grading activities occur;
  b. Dates when construction activities temporarily or permanently cease on a portion of or all of the site; and
  c. Dates when stabilization measures are initiated.

3.3.5. Once an area has been finally stabilized, the Permittee may identify this area in the SWPPP and no further SWPPP or inspection requirements shall apply to that area.

3.4. More than one Permittee. A SWPPP may identify more than one Permittee and may specify the responsibilities of each Permittee by task, area, and/or timing. Permittees may coordinate and prepare more than one SWPPP to accomplish this. However, in the event there is a requirement under the SWPPP for which responsibility is ambiguous or is not included in the SWPPP(s), each Permittee shall be responsible for implementation of that requirement. Each Permittee is also responsible for assuring that its activities do not render another Permittee's controls ineffective.

3.5. Contents of SWPPP. The SWPPP shall include the following items:

3.5.1. Site Description. Each SWPPP shall provide a description of pollutant sources and other information as indicated:

a. A description of the nature of the construction activity;

b. A description of the intended sequence of major activities which disturb soils for major portions of the site (e.g. grubbing, excavation, grading, utilities, and infrastructure installation);

c. Estimates of the total area of the site and the total area of the site that is expected to be disturbed by excavation, grading, or other activities, including areas for construction support;

d. An estimate of the runoff coefficient of the site after construction activities are completed and existing data describing the soil or the quality of any discharge from the site;

e. A general location map (e.g. portion of a city or county map or similar scale) and a site map indicating:

1) drainage patterns and approximate slopes anticipated after major grading activities;

2) construction boundaries and a description of existing vegetation prior to grading activities;

3) areas of soil disturbance, and areas of no disturbance;

4) the location of major structures and nonstructural controls identified in the SWPPP;

5) Locations of areas used for construction support;

6) the location of areas where stabilization practices are expected to occur;

7) the location of surface waters (including wetlands); and

8) locations where storm water is discharged or will discharge to a surface water;

f. A description of any discharge associated with industrial activity other than construction at the site (including storm water discharges from dedicated portable asphalt plants and dedicated portable concrete plants), whether or not those discharges are covered by the Permit; and the location of that activity;

g. The name of the receiving water(s), and aerial extent of wetland acreage at the site; and

h. A copy of this Permit.

3.5.2. Controls. The SWPPP shall employ best management practices to control pollutants in storm water discharges. Each plan shall include a description of appropriate controls and measures that will be implemented during construction activity and while the site is unstabilized. The plan must clearly describe for each major activity identified in Part 3.5.1(b) appropriate control measures and the timing during the construction process that the measures will be implemented. The description and implementation of controls shall address the following minimum components:

a. Erosion and Sediment Controls.

1) Short and Long Term Goals and Criteria:

A) The construction-phase erosion and sediment controls should be designed to retain sediment on site to the maximum extent practicable.

B) All control measures must be properly selected, installed, and maintained in accordance with the manufacturer's specifications and good engineering practices. If periodic inspections or other information indicates a control has been used inappropriately, incorrectly, or is ineffective the Permittee must replace or modify the control for site situations.

C) If sediments escape the construction site, off-site accumulations of sediment must be removed at a frequency sufficient to minimize the possibility of offsite impacts such as fugitive sediments washing into storm sewers by the next rain or posing a safety hazard to users of public streets.

D) Sediment must be removed from sediment traps or sedimentation ponds when design capacity has been reduced by 50%.

E) Litter, construction debris, and construction chemicals exposed to storm water shall be picked up prior to anticipated storm events (e.g. forecasted by local weather reports), or otherwise prevented from becoming a pollutant source for storm water discharges (e.g. screening outfalls, picked up daily, etc.).

F) Offsite material storage areas (also including overburden and stockpiles of dirt, etc.) used solely by the Permitted project are considered a part of the project and, unless a Permittee submits a separate NOI for such areas or they are subject to a separate UPDES permit, they shall be addressed in the SWPPP.

2) <u>Stabilization Practices</u>. A description of existing interim and permanent stabilization practices, including site-specific scheduling of the implementation of the practices. SWPPPs should ensure that existing vegetation is preserved where attainable and that disturbed portions of the site are stabilized. Stabilization practices may include: temporary seeding, permanent seeding, mulching, geo-textiles, sod stabilization, vegetative buffer strips, protection of trees, preservation of mature vegetation, and other appropriate measures. Use of impervious surfaces for stabilization should be avoided. Except as provided in paragraphs (A) and (B) below (Parts 3.5.2(a)(2)(A) and (B)), stabilization measures shall be initiated as soon as practicable in portions of the site where construction activities have temporarily or permanently ceased, but in no case more than 14 days after the construction activity in that portion of the site has temporarily or permanently ceased.

A) Where the initiation of stabilization measures by the 14th day after construction activity temporarily or permanently ceases is precluded by snow cover or frozen ground conditions, stabilization measures shall be initiated as soon as practicable.

B) Where construction activity on a portion of the site is temporarily ceased, and earth disturbing activities will be resumed within 21 days, temporary stabilization measures do not have to be initiated on that portion of the site.

3) <u>Structural Practices</u>. The permittee shall provide a description of

structural practices that divert flows from exposed soils, store flows or otherwise limit runoff and the discharge of pollutants from exposed areas of the site to the degree attainable. Such practices may include silt fences, earth dikes, drainage swales, sediment traps, check dams, subsurface drains, pipe slope drains, level spreaders, storm drain inlet protection, rock outlet protection, reinforced soil retaining systems, gabions, and temporary or permanent sediment basins. Placement of structural practices in floodplains should be avoided to the degree attainable. The installation of these devices may be subject to Section 404 of the federal Clean Water Act ("CWA").

A) <u>10 Acre Sediment Basin Requirement</u>. Where attainable, for common drainage locations that serve areas with 10 or more acres disturbed at one time, the Permittee shall provide a temporary (or permanent) sediment basin that provides storage for a 10 year, 24 hour storm event, a calculated volume of runoff for disturbed acres drained, or equivalent control measures, until final stabilization of the site. Where calculations are not performed, a sediment basin providing 3,600 cubic feet of storage per acre drained (a 1 inch storm event), or equivalent control measures, shall be provided where attainable until final stabilization of the site. The required sizing of the sediment basin does not include flows from offsite areas and flows from onsite areas that are either undisturbed or have undergone final stabilization where such flows are diverted around both the disturbed area and the sediment basin. In determining whether installing a sediment basin is attainable, factors such as site soils, slope, and available area on site shall be considered. For drainage locations which serve 10 or more disturbed acres at one time and where a temporary sediment basin or equivalent controls is not attainable, smaller sediment basins and/or sediment traps (with comparable storage) must be used; or

  (i) at a minimum, equivalent controls in silt fences, vegetative buffer strips, sod, mulch, geo-textiles, stepped check dams, pipe slope drains or other sediment or erosion controls are required for all erodible areas, down slope boundaries of the construction area and side slope boundaries deemed appropriate as dictated by individual site conditions; or

  (ii) it can be shown that site meteorological conditions do not warrant equivalent storage during the time period the 10-acres are destabilized (little or no chance of precipitation for the period of surface destabilization).

B) <u>Less Than 10 Acre BMP Requirement</u>. For drainage locations serving less than 10 acres, sediment basins and/or sediment traps should be used. At a minimum, silt fences, vegetative buffer strips, or equivalent sediment controls are required for all down slope boundaries (and those side slope boundaries deemed appropriate as dictated by individual site conditions) of the construction area unless a sediment basin providing storage for

3,600 cubic feet of storage per acre drained is provided.

b. Storm Water Management. Description of measures that will be installed during the construction process to control pollutants in storm water discharges that will occur after construction operations have been completed. Structural measures should be placed on upland soils to the degree attainable. The installation of these devices may be subject to Section 404 of the CWA. This Permit only addresses the installation of storm water management measures, and not the ultimate operation and maintenance of such structures after the construction activities have been completed and the site has undergone final stabilization. Permittees are only responsible for the installation and maintenance of storm water management measures prior to final stabilization of the site, and are not responsible for maintenance after storm water discharges associated with construction activity have been eliminated from the site. However, post-construction storm water BMPs that discharge pollutants from point sources once construction is completed, may in themselves, need authorization under a separate UPDES permit and are likely regulated under local municipal requirements.
   1) Such measures may include:
      A) storm water detention structures (including wet ponds);
      B) storm water retention structures;
      C) flow-attenuation by use of open vegetated swales and natural depressions;
      D) infiltration of runoff onsite; and
      E) sequential systems (which combine several practices).
   2) The SWPPP shall include an explanation of the technical basis used to select the practices to control pollution where flows exceed predevelopment levels.
   3) Storm water velocity dissipation devices shall be placed at discharge locations and along the length of any outfall channel for the purpose of providing a non-erosive flow velocity from the structure to a water course so that the natural physical and biological characteristics and functions are maintained and protected. The objective is to minimize significant changes in the hydrological regime of the receiving water.

c. Other Controls.
   1) Waste Disposal. No solid materials, including building materials, shall be discharged to waters of the State, except as authorized by a federal CWA Section 404 permits.
   2) Off-site Tracking. Off-site vehicle tracking of sediments and the generation of dust shall be minimized.
   3) Septic, Waste, and Sanitary Sewer Disposal. The SWPPP shall ensure and demonstrate compliance with applicable State and/or local waste disposal, sanitary sewer or septic system regulations.
   4) Exposure to Construction Materials. The SWPPP shall include a narrative description of practices to reduce pollutants from construction related materials which are stored onsite including an inventory of construction materials (including waste materials), storage practices to minimize exposure of the materials to storm water, and spill prevention and

response.

5) Support Areas. A description of pollutant sources from areas other than construction (including storm water discharges from dedicated portable asphalt plants and dedicated portable concrete plants), and a description of controls and measures that will be implemented at those sites.

d. Other Laws and Requirements.

1) Local Storm Water Control Requirements. This Permit does not relieve the Permittee from compliance with other laws effecting erosion and sediment control or requirements for the permanent storm water system. Where applicable, compliance efforts to these requirements should be reflected in the SWPPP.

2) Threatened or Endangered Species & Historic Properties. This Permit does not relieve the Permittee from compliance with Federal or State laws pertaining to threatened or endangered species or historic properties. Where applicable compliance efforts to these laws should be reflected in the SWPPP.

3) Variance of Permit Requirements. Dischargers seeking alternative permit requirements shall submit an individual UPDES permit application in accordance with applicable law to the address indicated in Part 5.11 of this Permit, along with a description of why requirements in this Permit should not be applicable as a condition of a UPDES permit.

3.5.3. Maintenance. All vegetation, erosion and sediment control measures and other protective measures identified in the SWPPP shall be maintained in effective operating condition. A description of procedures to ensure the timely maintenance of these measures shall be identified in the SWPPP. Maintenance needs identified in inspections or by other means shall be accomplished before the next anticipated storm event, or as necessary to maintain the continued effectiveness of storm water controls. If maintenance prior to the next anticipated storm event is impracticable, maintenance must be scheduled and accomplished as soon as practicable.

3.5.4. Inspections.

a. Inspections must be conducted in accordance with one of the two schedules listed below. The Permittee shall specify in its SWPPP which schedule it will be following.

1) At least once every 7 calendar days; or

2) At least once every 14 calendar days and within 24 hours of the end of a storm event of 0.5 inches or greater.

b. Inspection frequency may be reduced to at least once every month if:

1) The entire site is temporarily stabilized; or

2) Runoff is unlikely due to winter conditions (e.g., site is covered with snow, ice, or the ground is frozen).

c. The inspection requirement is waived until one month before thawing conditions are expected to result in a discharge if all of the following requirements are met:

1) The project is located in an area where frozen conditions are anticipated to continue for extended periods of time (i.e., more than one month);

2) Land disturbance activities have been suspended; and
3) The beginning and ending dates of the waiver period are documented in the SWPPP.

d. Inspections must be conducted by qualified personnel (provided by the operator or cooperatively by multiple operators). "Qualified personnel" means a person knowledgeable in the principles and practice of erosion and sediment controls who possesses the skills to assess conditions at the construction site that could impact storm water quality and to assess the effectiveness of any sediment and erosion control measures selected to control the quality of storm water discharges from the construction activity.
e. Inspections must include all areas of the site disturbed by construction activity and areas used for storage of materials that are exposed to precipitation. Inspectors must look for evidence of, or the potential for, pollutants entering the storm water conveyance system. Sedimentation and erosion control measures identified in the SWPPP must be observed to ensure proper operation. Discharge locations must be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to waters of the United States, where accessible. Where discharge locations are inaccessible, nearby downstream locations must be inspected to the extent that such inspections are practicable. Locations where vehicles enter or exit the site must be inspected for evidence of off-site sediment tracking.
f. Inspections at construction sites involving utility line installation, pipeline construction, and other long, narrow, linear construction may be more limited if the areas described in Part 3.5.4(e) of this Permit are not reasonably accessible or could cause additional disturbance of soils and increase the potential for erosion. In these circumstances, controls must be inspected at the same frequency as other construction projects, but personnel may instead inspect controls along the construction site for 0.25 mile above and below each access point where a roadway, undisturbed right-of-way, or other similar feature intersects the construction site and allows access to the areas described above. In the absence of evidence to the contrary, the conditions of the controls along each inspected 0.25 mile segment may be considered as representative of the condition of controls along that reach extending from the end of the 0.25 mile segment to either the end of the next 0.25 mile inspected segment, or to the end of the project, whichever occurs first.
g. For each inspection required above, the inspector must complete an inspection report. At a minimum, the inspection report must include:
   1) The inspection date;
   2) Names, titles, and qualifications of personnel making the inspection;
   3) Weather information for the period since the last inspection (or since commencement of construction activity if the first inspection) including a best estimate of the beginning of each storm event, duration of each storm event, approximate amount of rainfall for each storm event (in inches), and whether any discharges occurred;
   4) Weather information and a description of any discharges occurring at the time of the inspection;
   5) Location(s) of discharges of sediment or other pollutants from the site;

6) Location(s) of BMPs that need to be maintained;
7) Location(s) of BMPs that failed to operate as designed or proved inadequate for a particular location;
8) Location(s) where additional BMPs are needed that did not exist at the time of inspection; and
9) Corrective action required including any changes to the SWPPP necessary and implementation dates.

h. A record of each inspection and of any actions taken in accordance with this Part 3 must be retained as part of the SWPPP for at least three years from the date that permit coverage expires or is terminated. The inspection reports must identify any incidents of non-compliance with the permit conditions. Where a report does not identify any incidents of non-compliance, the report must contain a certification that the construction project or site is in compliance with the SWPPP and this permit. The report must be signed in accordance with Part 5.16 of this Permit.

3.5.5. Non-Storm Water Discharges. Except for flows from fire fighting activities, sources of non-storm water listed in Part 1.5 of this Permit that are combined with storm water discharges associated with industrial activity must be identified in the SWPPP. The SWPPP shall identify and ensure the implementation of appropriate pollution prevention measures for the non-storm water component(s) of the discharge.

PART 4 . TERMINATION/CHANGES IN OWNER/OPERATOR FOR SITE

4.1. Termination of Coverage: Permittees may or shall (as specified) terminate coverage under this Permit under the following conditions:

4.1.1. Completion of construction activities and site stabilization: Permittees shall terminate coverage under this Permit by submitting a Notice of Termination ("NOT") within thirty days after completion of all construction activities, completion of final stabilization of all areas of the site as defined in Part 6.15. The NOT shall be submitted on the form specified by the Executive Secretary.

4.1.2. Partial completion of construction activities and site stabilization: A Permittee who, as specified in Part 3.4 of this Permit, is identified in the SWPPP as responsible for a specific area may terminate coverage under this Permit by submitting an NOT within thirty days after completion, for that area, of all construction activities, completion of final stabilization of all areas for which the Permittee was responsible and that were disturbed. The NOT shall be submitted on the form specified by the Executive Secretary, and the Permittee shall indicate on the form that it is a partial NOT.

4.1.3. New responsible owner/operator: A Permittee may terminate its coverage under this Permit by submitting an NOT if another party (or parties) assumes responsibility for all remaining SWPPP requirements. Termination of the Permittee's responsibilities under the SWPPP will not be final until the other party (or parties) submits an NOI. If the new responsible owner/operator fails to submit an NOI, the Permittee may complete termination by demonstrating to the Executive Secretary that it has entered into contracts that obligate the new owner/operator to undertake all remaining responsibilities under the SWPPP.

4.2. Conditions for Submitting an NOT: A Permittee may not submit an NOT unless it meets the requirements specified in Part 4.1. Appropriate enforcement actions may be taken if an NOT is submitted without these requirements having been met, and the Permittee may also continue to be responsible for any Permit violations.

4.3. Updating the SWPPP: If an NOT is submitted under Part 4.1.2 or 4.1.3, the SWPPP shall be updated by the remaining Permittee(s) to meet the requirements of Part 3.4 of the Permit.

PART 5. STANDARD PERMIT CONDITIONS

5.1. Duty to Comply.

5.1.1. The Permittee must comply with all conditions of this Permit. Any Permit noncompliance constitutes a violation of the Act and is grounds for enforcement action; for Permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

5.1.2. Penalties for Violations of Permit Conditions.

a. Violations. The Act provides that any person who violates the Act, Utah wastewater rules, or conditions of a permit issued under the Act is subject to a fine of $10,000 per day.

b. Willful or Gross Negligence. The Act provides that any person who discharges a pollutant to waters of the State as a result of criminal negligence or who intentionally discharges is criminally liable and is subject to imprisonment and a fine of up to $50,000 per day. Utah Code Ann. § 19-5-115.

c. False Statements. The Act provides that any person who knowingly makes any false material statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under the Act, the rules, or this Permit, or who knowingly falsifies, tampers with, or renders inaccurate, any monitoring device or method required to be maintained under the Act shall upon conviction , be punished by a fine of not more than $10,000 or by imprisonment for 6 months, or by both. Utah Code Ann. § 19-5-115(4).

5.2. Dut y to Reapply. If a Permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, it must apply for and obtain a new permit except as provided in Part 2.4 of this Permit.

5.3. Need to halt or reduce activity not a defense. It shall not be a defense for a Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Permit.

5.4. Duty to Mitigate. The Permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this Permit which has a reasonable likelihood of adversely affecting human health or the environment.

5.5. Duty to Provide Information. The Permittee shall furnish to the Executive Secretary or an authorized representative, within a reasonable time, any information which is requested to determine compliance with this Permit. The Permittee must also furnish to the Executive Secretary or an authorized representative copies of records to be kept by this Permit.

5.6. Other Information. When the Permittee becomes aware that he or she failed to submit any relevant facts or submitted incorrect information in the Notice of Intent or in any other report to the Executive Secretary, he or she shall promptly submit such facts or information.

5.7. Oil and Hazardous Substance Liability. Nothing in this Permit shall be construed to preclude the institution of any legal action or relieve the Permittee from any responsibilities, liabilities, or penalties to which the Permittee is or may be subject under the "Act".

5.8. Property Rights. The issuance of this Permit does not convey any property rights of any sort, nor any exclusive privileges, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations.

5.9. Severability. The provisions of this Permit are severable, and if any provision of this Permit, or the application of any provision of this Permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this Permit shall not be affected thereby.

5.10. Record Retention.

5.10.1. The Permittee shall retain copies of SWPPPs and all reports required by this Permit, and records of all data used to complete the Notice of Intent to be covered by this Permit, for a period of at least three years from the date that the site is finally stabilized. This period may be extended by request of the Executive Secretary at any time.

5.10.2. After final stabilization of the construction site is complete, the SWPPP is no longer required to be maintained on site, but may be maintained by the Permittee(s) at its primary headquarters. Access to the SWPPP will continue as described in Part 3.2, however.

5.11. Addresses. All written correspondence under this permit shall be directed to the Division of Water Quality at the following address:

Department of Environmental Quality
Division of Water Quality
288 North 1460 West
PO Box 144870
Salt Lake City, Utah 84114-4870

5.12. State Laws.

5.12.1. Nothing in this Permit shall be construed to preclude the institution of any legal action or relieve the Permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Utah Code Ann. § 19-5-117.

5.12.2. No condition of this Permit shall release the Permittee from any responsibility or requirements under other environmental statutes or regulations.

5.13. Proper Operation and Maintenance. The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this Permit and with the requirements of SWPPPs. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. Proper operation and maintenance requires the operation of backup or auxiliary facilities or similar systems, installed by a Permittee only when necessary to achieve compliance with the conditions of the Permit.

5.14. Inspection and Entry. The Permittee shall allow, upon presentation of credentials, the Executive Secretary or an authorized representative:

5.14.1. To enter upon the Permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this Permit;

5.14.2. Have access to and copy at reasonable times, any records that must be kept under the conditions of this Permit;

5.14.3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Permit; and

5.14.4. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by law, any substances or parameters at any location.

5.15 Reopener Clause.

5.15.1. Reopener Due to Water Quality Impacts. If there is evidence indicating that the storm water discharges authorized by this Permit cause, have the reasonable potential to cause or contribute to, a violation of a water quality standard, the discharger may be required to obtain an individual permit or an alternative general permit in accordance with Part 2.3 of this Permit or the Permit may be modified to include different limitations and/or requirements.

5.15.2. Reopener Guidelines. Permit modification or revocation will be conducted according to UAC R317-8-5.6 and UAC R317-8-6.2.

5.15.3. Permit Actions. This Permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Permittee for a Permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Permit condition.

5.16. Signatory Requirements.

5.16.1. All Notices of Intent, SWPPPs, reports, certifications or information submitted to the Executive Secretary, or that this Permit requires be maintained by the Permittee, shall be signed as follows:

a. All Notices of Intent shall be signed as follows:

1) For a corporation: by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or the manager of one or more manufacturing, production or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25,000,000 (in second-quarter 1980 dollars) if authority to sign

documents has been assigned or delegated to the manager in accordance with corporate procedures;

2) For a partnership of sole proprietorship: by a general partner or the proprietor, respectively; or

3) For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes (1) the chief executive officer of the agency, or (2) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g. Regional Administrators of EPA).

b. All reports required by the Permit and other information requested by the Executive Secretary or by an authorized representative of the Executive Secretary shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

1) The authorization is made in writing by a person described above and submitted to the Executive Secretary; and

2) The authorization specifies either an individual or a position having responsibility for overall operation of the regulated site, facility or activity, such as the position of manager, operator, superintendent, or position of equivalent responsibility or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position).

c. Certification. Any person signing documents under this Part 5.16 shall make the following certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

5.16.2. If a document is to be signed electronically, the Division's rules regarding electronic transactions govern.

PART 6. DEFINITIONS

As used in this Permit:

6.1. "Act" means the "Utah Water Quality Act"

6.2. "Best Management Practices" ("BMPs") means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants to waters of the State. BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

6.3. "Common plan of development or sale" means one plan for development or sale, separate parts of which are related by any announcement, piece of documentation (including a sign, public notice or hearing, sales pitch, advertisement, drawing, plat, blueprint, contract, permit application, zoning request, computer design, etc.), physical demarcation (including boundary signs, lot stakes, surveyor markings, etc.), or continuing obligation (including contracts) that identify the scope of the project. A plan may still be a common plan of development or sale even if it is taking place in separate stages or phases, is planned in combination with other construction activities, or is implemented by different owners or operators.

6.4. "Commencement of Construction" means the initial disturbance of soils associated with clearing, grading, or excavating activities or other construction activities.

6.5. "Construction activity" means soil disturbing activities such as clearing, grading, and excavating of land. The term also includes construction support activities.

6.6. "Construction support activities" means construction material and equipment storage and maintenance, concrete or asphalt batch plants, except as provided in Part 1.4.3 of this Permit.

6.7. "Control Measure" refers to any Best Management Practice or other method used to prevent or reduce the discharge of pollutants to waters of the State.

6.8. "CWA" means Clean Water Act or the Federal Water Pollution Control Act.

6.9. "Dedicated portable asphalt plant" means a portable asphalt plant that is located on or contiguous to a construction site and that provides asphalt only to the construction site that the plant is located on or adjacent to.

6.10. "Dedicated portable concrete plant" means a portable concrete plant that is located on or contiguous to a construction site and that provides concrete only to the construction site that the plant is located on or adjacent to.

6.11. "Discharge," when used without qualification, means the discharge of a pollutant.

6.12. "EPA" means the United States Environmental Protection Agency.

6.13. "Eligible" means qualified for authorization to discharge storm water under this general permit.

6.14. "Executive Secretary" means Executive Secretary of the Utah Water Quality Board.

6.15. "Final Stabilization" means that all soil disturbing activities at the site have been completed, and that a uniform (e.g. evenly distributed, without large bare areas) perennial vegetative cover with a density of 70% of the native background vegetative cover for the area has been established on all unpaved areas and areas not covered by permanent structures, or equivalent permanent stabilization measures (such as the use of riprap, gabions, or geo-textiles) have been employed. In some parts of the country, background native vegetation will cover less than 100% of the ground (e.g. arid areas). Establishing at least 70% of the natural cover of native vegetation meets the vegetative cover criteria for final stabilization. For example, if the native vegetation covers 50% of the ground, 70% of 50% would require 35% total cover for final stabilization. For individual lots in residential construction, final stabilization means that either the homebuilder has completed final stabilization as specified above, or the homebuilder has established temporary stabilization including perimeter controls for an individual lot prior to occupation of the home by the homeowner and has obligated the homeowner, by contract, to complete the requirements for final stabilization within two years.

6.16. "Indian Country" is defined as in 40 CFR §122.2 to mean:

1. All land within the limits of any Indian reservation under the jurisdiction of the United States Government, notwithstanding the issuance of any patent, and, including rights-of-way running through the reservation;
2. All dependent Indian communities within the borders of the United States whether within the originally or subsequently acquired territory thereof, and whether within or without the limits of a state; and
3. All Indian allotments, the Indian titles to which have not been extinguished, including rights-of-ways running through the same.

6.17. "Municipal Separate Storm Sewer System" refers to all separate storm sewers that are owned or operated by the United States, a State, city, town, county, district, association, or other public body having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer districts, flood control districts or drainage districts, or similar entity that discharges to waters of the State.

6.18. "NOI" means notice of intent to be covered by this Permit.

6.19. "NOT" means notice of termination.

6.20. "Point Source" means any discernible, confined, and discrete conveyance, including but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, landfill leachate collection system, vessel or other floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural storm water runoff.

6.21. "Runoff coefficient" means the fraction of total rainfall that will appear at conveyance as runoff.

6.22. "Site" means the land or water area where any "facility or activity" is physically located or conducted, including adjacent land used in connection with the facility or activity.

6.23. "Storm water" means storm water runoff, snow melt runoff, and surface runoff and drainage.

6.24. "Storm water discharge associated with industrial activity" is defined in the Utah Administrative Code (UAC) R317-8-3.9(6)(c) & (d) and incorporated here by reference. Most relevant to this Permit is UAC R317-8-3.9(6)(d)10, which relates to construction activity including clearing, grading and excavation activities.

6.25: SWPPP means Storm Water Pollution Prevention Plan, referring to the plan required in Part 3 of this Permit.

6.26. "Total Maximum Daily Load" or "TMDL" means the sum of the individual wasteload allocations (WLAs) for point sources and load allocations (LAs) for nonpoint sources and natural background. If a receiving water has only one point source discharger, the TMDL is the sum of that point source WLA plus the LAs for any nonpoint sources of pollution and natural background sources, tributaries, or adjacent segments. TMDLs can be expressed in terms of either mass per time, toxicity, or other appropriate measure.

6.27. Waters of the State means all streams, lakes, ponds, marshes, water-courses, waterways, wells, springs, irrigation systems, drainage systems, and all other bodies or accumulations of water, surface and underground, natural or artificial, public or private, which are contained within, flow throw, or border upon this state or any portion thereof, except that bodies of water confined to and retained within the limits of private property, and which do not develop into or constitute a nuisance, or a public health hazard, or a menace to fish and wildlife, shall not be considered to be waters of the state (UAC R317-1-1.31).

STATE OF UTAH, DEPARTMENT OF ENVIRONMENTAL QUALITY, DIVISION OF WATER QUALITY
288 North 1460 West, P.O. Box 144870, Salt Lake City, Utah 84114-4870

NOT

Notice of Termination (NOT) for Storm Water Discharges Associated with Construction Activity Under the UPDES General Permit No. UTR100000. **SEE REVERSE FOR INSTRUCTIONS**

Submission of this Notice of Termination constitutes notice that the operator identified in Section II of this form is no longer authorized to discharge storm water associated with industrial activity under the UPDES program ALL NECESSARY INFORMATION MUST BE PROVIDED ON THIS FORM.

I. Permit Information

UPDES Storm Water General Permit Number: ____________________

Check Here if You are No Longer the Operator of the Facility: ☐ Check Here if the Storm Water Discharge is Being Terminated: ☐

II. Facility Operator Information

Name: ____________________ Phone: ____________________

Address ____________________

City: ____________________ State ______ Zip: ____________________

III. Facility Site/Location Information

Name: ____________________

Address. ____________________ County: ____________

City: ____________________ State: ______ Zip: ____________________

Latitude: ____________________ Longitude ____________________

IV. Certification: I certify under penalty of law that either. a) all storm water discharges associated with construction activity from the portion of the identified facility where I was an operator have ceased or have been eliminated or b) I am no longer an operator at the construction site and a new operator has assumed operational control for those portions of the construction site where I previously had operational control. I understand that by submitting this notice of termination, I am no longer authorized to discharge storm water associated with construction activity under this general permit. and that discharging pollutants in storm water associated with construction activity to waters of the State is unlawful under the State of Utah Water Quality Act where the discharge is not authorized by a UPDES permit. I also understand that the submittal of this notice of termination does not release an operator from liability for any violations of this permit or the Water Quality Act.

Print Name: ____________________ Date ____________

Signature: ____________________

Instructions for Completing Notice of Termination (NOT) Form

Who May File A Notice Of Termination (NOT) Form

Permittees who are presently covered under the State issued Utah Pollutant Discharge Elimination System (UPDES) General Storm Water Permit for Construction Activity may submit a notice of termination (NOT) form when their facilities no longer have any storm water discharges associated with industrial activity as defined in the storm water regulations at UAC R317-8-3 9(b)(c) and (d). or when they are no longer the operator of the facilities.

For construction activities. elimination of all storm water discharges associated with industrial activity occurs when disturbed soils at the construction site have been finally stabilized and temporary erosion and sediment control measures have been removed or will be removed at an appropriate time. or that all storm water discharges associated with construction activity from the construction site that are authorized by a UPDES general permit have otherwise been eliminated. Final stabilization means that all soil-disturbing activities at the site have been completed. and that a uniform perennial vegetative cover with a density of 70% of the cover for unpaved areas and areas not covered by permanent structures has been established. or equivalent permanent stabilization measures (such as the use of riprap, gabions. or geotextiles) have been employed.

Where to File NOT Form

Send this form to the following address

Division of Water Quality
288 North 1460 West
P.O. Box 144870
Salt Lake City, Utah 84114-4870

Completing the Form

Type or print, using upper-case letters, in the appropriate areas only. Please place each character between the marks. Abbreviate if necessary to stay within the number of characters allowed for each item. Use only one space for breaks between words, but not for punctuation marks unless they are needed to clarify your response. If you have any questions about this form, call the Division of Water Quality at (801) 538-6146.

Section I - Permit Information

Enter the existing UPDES Storm Water General Permit number assigned to the facility or site identified in Section III. If you do not know the permit number, contact the Division of Water Quality at (801) 538-6146

Indicate your reason for submitting this Notice of Termination by checking the appropriate box:

If there has been a change of operator and you are no longer the operator of the facility or site identified in Section III, Check the corresponding box.

If all storm water discharges at the facility or site identified in Section III have been terminated, check the corresponding box

Section II - Facility Operator Information

There may be more than one operator for a construction project. This form must be filled out and submitted by each of the operators listed on the notice of intent (NOI) that was submitted for receiving coverage under this permit. In this section give the legal name of the person, firm, public organization, or any other entity that is filed as an operator at the facility or site described in this application that is desiring to terminate coverage. The name of the operator may or may not be the same name as the facility. The operator of the facility is the legal entity which controls the facility's operation (referring to operation of construction activity) or a portion of it, rather that the plant or site manager of the finished or rehabilitated facility. Do not use a colloquial name. Enter the complete address and telephone number of the operator.

Section III - Facility/Site Location Information

Enter the facility's or site's official or legal name and complete address, including city, state and ZIP code and the latitude and longitude of the facility to the nearest 15 seconds of the approximate center of the site. It is preferred that the location address be the same as that which the site used in the submission of the NOI.

Section IV - Certification

State statues provide for severe penalties for submitting false information on this application form. State regulations require this application to be signed as follows:

For a corporation: by a responsible corporate officer, which means: (I) president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions, or (ii) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

For a municipality, State, Federal, or other public facility: by either a principal executive officer or ranking elected official.

STATE OF UTAH, DEPARTMENT OF ENVIRONMENTAL QUALITY, DIVISION OF WATER QUALITY
288 North 1460 West, P.O. Box 144870, Salt Lake City, Utah 84114-4870 (801)538-6146

NOI

Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity Under the UPDES General Permit No. UTR100000. **SEE REVERSE FOR INSTRUCTIONS**

Submission of this Notice of Intent constitutes notice that the party(s) identified in Section I of this form intends to be authorized by UPDES General Permit No. UTR100000 issued for storm water discharges associated with construction activity in the State of Utah. Becoming a permittee obligates such discharger to comply with the terms and conditions of the permit. ALL NECESSARY INFORMATION MUST BE PROVIDED ON THIS FORM.

I. OPERATOR INFORMATION

Name (Main operator): ______________________ Phone: ____________

Address: ______________________ Status of Owner/Operator: ☐

City: ______________________ State: _____ Zip: ____________

Contact Person: ______________________ Phone: ____________

Name (1st Co-permittee): ______________________ Phone: ____________

Address: ______________________ Status of Owner/Operator: ☐

City: ______________________ State: _____ Zip: ____________

Contact Person: ______________________ Phone: ____________

Name (2nd Co-permittee): ______________________ Phone: ____________

Address: ______________________ Status of Owner/Operator: ☐

City: ______________________ State: _____ Zip: ____________

Contact Person: ______________________ Phone: ____________

Name (3rd Co-permittee): ______________________ Phone: ____________

Address: ______________________ Status of Owner/Operator: ☐

City: ______________________ State: _____ Zip: ____________

Contact Person: ______________________ Phone: ____________

Please copy this form if you have more co-permittees than what is allowed on this form.

II. FACILITY SITE / LOCATION INFORMATION

Name: ______________________

Project No. (if any): ______________________

Is the facility located on Indian Lands?

(Y or N) ☐

Address: ______________________ County: ____________

City: ______________________ State: _____ Zip: ____________

Latitude: ______________________ Longitude: ______________________

INSTRUCTIONS

Notice Of Intent (NOI) For Covered Under the UPDES General Permit
Storm Water Discharges From Construction Activities

Who Must File A Notice Of Intent (NOI) Form

State law at UAC R317-8-3.9 prohibits point source discharges of storm water from construction activities to a water body(ies) of the State without a Utah Pollutant Discharge Elimination System (UPDES) permit. The operator of a construction activity that has such a storm water discharge must submit a NOI to obtain coverage under the UPDES Storm Water General Permit. If you have questions about whether you need a permit under the UPDES Storm Water program, or if you need information as to whether a particular program is administered by EPA or a state agency, contact the storm water coordinator at (801) 538-6146.

Where To File NOI Form

NOIs, with fee payment(s), must be sent to the following address:

Department of Environmental Quality
Division of Water Quality
P.O. Box 144870
Salt Lake City, UT 84114-4870

Completing The NOI Form

You must type or print, using upper-case letters, in the appropriate areas only. Please place each character between the marks. Abbreviate if necessary to stay within the number of characters allowed for each item. Use one space for breaks between words, but not for punctuation marks unless they are needed to clarify your response. If you have any questions on this form please call the storm water coordinator at (801) 538-6146.

Beginning of Coverage

Storm Water General Permits cover a facility quickly avoiding delays, therefore coverage is immediate after NOI with submission of the permit fee. The permittee should be aware that though you may not have a permit in hand, if you have sent in a completed NOI with permit fee you are covered by the conditions in the permit and will be expected to pply with these conditions. If you wish, contact the Division of Water Quality at (801) -6146 to receive a generic copy of the permit. After we receive the NOI and the permit fee we will send you an official copy of the permit with your permit number.

Permit Fees (*MAKE CHECKS PAYABLE TO: DIVISION OF WATER QUALITY*)

Construction projects are prorated from the time they begin disturbing ground until the time the disturbed surface is stabilized, and the permit is terminated by the permittee with a submittal of a Notice of Termination (NOT) form. Fees are prorated at $8.34 per month of coverage needed, except a $100 minimum. EXAMPLE: if you need 9 months of coverage: 9 x $8.34 = $75.06, then you will need to submit the $100 minimum, if 18 months of coverage is needed: 18 x $8.34 = $150.12, your total fee will be $150.12. Permit coverages extending beyond the expiration date of the general permit will be extended under the reissued general permit. State or local political subdivisions are exempt from the permit fee. The fee must be received with the NOI before permit coverage is given.

General

Facilities within Salt Lake City or Salt Lake County must contact the city or county and notify them of the new permit status for the facility.

SECTION I - FACILITY OPERATOR INFORMATION

Give the legal name(s) of the person(s), firm(s), public organization(s), or any other entity(ies) that conducts the construction operation at the facility or site described in this application. The name of the operator(s) may be the developer, the owner, the general contractor, the design firm, the excavation contractor and/or others (e.g. anyone that fits the definition of operator). An operator is anyone that has control over site/project specifications and/or control of day to day operational activities. Do not use a colloquial name. Enter the complete address and telephone number of the operator(s).

Enter the appropriate letter to indicate the legal status of the operator of the facility.
F = Federal M = Public (other than Fed or State) S = State P = Private

SECTION II - FACILITY/SITE LOCATION INFORMATION

Enter the facility's or site's official or legal name and project number (if any) and nplete street address, including city, state and ZIP code. If the facility or site lacks a et address, indicate the latitude and longitude of the facility to the nearest 15 seconds he approximate center of the site.

Indicate whether the facility is located on Indian Lands.

If the facility is located on Indian Lands EPA form 3510-6 should be used and submitted to EPA Region VIII except for facilities on the Navajo Reservation or on the Goshute Reservation which should submit EPA form 3510-6 to Region IX.

SECTION III - SITE ACTIVITY INFORMATION

If the storm water discharges to a municipal separate storm sewer system (MS4), enter the name of the operator of the MS4 (e.g., municipality name, county name) and the receiving water of the discharge from the MS4 if it is known. (A MS4 is defined as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) that is owned or operated by a state, city, town, county, district, association or other public body which is designed or used for collecting or conveying storm water).

SECTION IV - TYPE OF CONSTRUCTION

Check each type of construction that applies to this application.

SECTION V - MANAGEMENT PRACTICES

Check each type of management practices that will be used to control storm water runoff at the job site.

SECTION VI - ADDITIONAL INFORMATION REQUIRED

Enter the project start date and the estimated completion date for the entire development plan.

Provide an estimate of the total number of acres of the site on which soil will be disturbed (round to the nearest acre).

Indicate whether the storm water pollution prevention plan for the site is in compliance with approved state and/or local sediment and erosion plans, permits, or storm water management plans.

SECTION VII - CERTIFICATION

State statutes provide for severe penalties for submitting false information on this *application form. State regulations require this application to be signed as follows:*

For a corporation: by a responsible corporate officer, which means: (I) president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions, or (ii) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

For a partnership or sole proprietorship: by a general partner or the proprietor; or

For a municipality, state, Federal, or other public facility: by either a principal executive officer or ranking elected official.

POLLUTION PREVENTION PLAN

A storm water pollution prevention plan (SWP3) is required to be in hand before the NOI can be submitted. It is important to know SWP3 requirements (contained in the permit) even during the design portion of the project. A copy of the permit can be obtained from the Division of Water Quality. Guidance material for developing a SWP3 can be obtained from EPA (NTIS) or copied from EPA material at the Division of Water Quality.

NOTICE OF TERMINATION (NOT)

A completed Notice of Termination (NOT) form is required to terminate your permit at the end of construction. Please complete the NOT form, including the project's assigned permit number, and return it to the Division of Water Quality. Please contact the storm water coordinator at (801) 538-6146 for any questions or for a copy of the NOT form.

10/30/97

III. SITE ACTIVITY INFORMATION

Municipal Separate Storm Sewer System (MS4) Operator Name: ____________________

Receiving Water Body: ____________________ **How far to the nearest water body?** __________ **ft. miles. (circle one)**

List the Number of any other UPDES permits at the site: ____________________

IV. TYPE OF CONSTRUCTION (Check all that apply)

1. ☐ Residential 2. ☐ Commercial 3. ☐ Industrial 4. ☐ Road 5. ☐ Bridge 6. ☐ Utility 7. ☐ Contouring, Landscaping

8. ☐ Other (Please list) ____________________

V. BEST MANAGEMENT PRACTICES

Identify proposed Best Management Practices (BMPs) to reduce pollutants in storm water discharges: (Check all that apply)

1. ☐ Silt Fences 2. ☐ Sediment Pond 3. ☐ Seeding/Preservation of Vegetation 4. ☐ Mulching/Geotextiles 5. ☐ Check Dams 6. ☐ Structural Controls (Berms, Ditches, etc.)

7. ☐ Other (Please list) ____________________

VI. ADDITIONAL INFORMATION REQUIRED

Project Start Date: __________ **Completion Date:** __________ **Estimated Area to be Disturbed (in Acres):** __________

A storm water pollution prevention plan has been prepared for this site and is to the best of my knowledge in Compliance with State and/or Local Sediment and Erosion Plans and Requirements.

(Y or N) ☐ (A pollution prevention plan is required to be on hand before submittal of the NOI)

VII. CERTIFICATION: **I certify under penalty of law that I have read and understand the *Part I.B.* eligibility requirements for coverage under the general permit for storm water discharges from construction activities. I further certify that to the best of my knowledge, all discharges and BMPs that have been scheduled and detailed in a pollution prevention plan will satisfy requirements of *Part I.B.* , and *Part III.* of this permit. I understand that continued coverage under this storm water general permit is contingent upon maintaining eligibility as provided for in *Part I.B.***

I also certify under penalty of law that this document and all attachments were prepared under the direction or supervision of those who have place their signature below, in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Print Name (of responsible person for the main operator from first page): ____________________ **Date:** __________

Signature: ____________________

Print Name (of responsible person for the 1st co-permittee from first page): ____________________ **Date:** __________

Signature: ____________________

Print Name (of responsible person for the 2nd co-permittee from first page): ____________________ **Date:** __________

Signature: ____________________

Print Name (of responsible person for 3rd co-permittee from first page): ____________________ **Date:** __________

Signature: ____________________

Amount of Permit Fee Enclosed: $__________

APPENDIX C

STATE WATER QUALITY STANDARDS

R317-2-14. Numeric Criteria.

TABLE 2.14.1
NUMERIC CRITERIA FOR DOMESTIC,
RECREATION, AND AGRICULTURAL USES

Parameter	Domestic Source 1C	Recreation and Aesthetics 2A	2B	Agri-culture 4
BACTERIOLOGICAL (30-DAY GEOMETRIC MEAN) (NO.)/100 ML) (7)				
E. coli	206	126	206	
MAXIMUM (NO.)/100 ML) (7)				
E. coli	940	576	940	
PHYSICAL				
pH (RANGE)	6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0
Turbidity Increase (NTU)		10	10	
METALS (DISSOLVED, MAXIMUM MG/L) (2)				
Arsenic	0.01			0.1
Barium	1.0			
Beryllium	<0.004			
Cadmium	0.01			0.01
Chromium	0.05			0.10
Copper				0.2
Lead	0.015			0.1
Mercury	0.002			
Selenium	0.05			0.05
Silver	0.05			
INORGANICS (MAXIMUM MG/L)				
Bromate	0.01			
Boron				0.75
Chlorite	<1.0			
Fluoride (3)	1.4-2.4			
Nitrates as N	10			
Total Dissolved Solids (4)	Irrigation			1200
	Stock Watering			2000
RADIOLOGICAL (MAXIMUM pCi/L)				
Gross Alpha	15			15
Gross Beta	4 mrem/yr			

Radium 226, 228 (Combined)	5							
Strontium 90	8							
Tritium	20000							
Uranium	30							
ORGANICS (MAXIMUM UG/L)								
Chlorophenoxy Herbicides								
2,4-D	70							
2,4,5-TP	10							
Methoxychlor	40							
POLLUTION INDICATORS (5)								
BOD (MG/L)					5		5	5
Nitrate as N (MG/L)		4		4				
Total Phosphorus as P (MG/L)(6)			0.05			0.05		

FOOTNOTES:

(1) Reserved

(2) The dissolved metals method involves filtration of the sample in the field, acidification of the sample in the field, no digestion process in the laboratory, and analysis by atomic absorption or inductively coupled plasma (ICP) spectrophotometry.

(3) Maximum concentration varies according to the daily maximum mean air temperature.

TEMP (C)	MG/L
12.0	2.4
12.1-14.6	2.2
14.7-17.6	2.0
17.7-21.4	1.8
21.5-26.2	1.6
26.3-32.5	1.4

(4) Total dissolved solids (TDS) limits may be adjusted if such adjustment does not impair the designated beneficial use of the receiving water. The total dissolved solids (TDS) standards shall be at background where it can be shown that natural or un-alterable conditions prevent its attainment. In such cases rulemaking will be undertaken to modify the standard accordingly.

(5) Investigations should be conducted to develop more information where these pollution indicator levels are exceeded.

(6) Total Phosphorus as P (mg/l) indicator for lakes and reservoirs shall be 0.025.

(7) Where the criteria are exceeded and there is a reasonable basis for concluding that the indicator bacteria are primarily from natural sources (wildlife),

e.g., in National Wildlife Refuges and State Waterfowl Management Areas, the criteria may be considered attained. Exceedences of bacteriological numeric criteria from nonhuman nonpoint sources will generally be addressed through appropriate Federal, State, and local nonpoint source programs.

TABLE 2.14.2
NUMERIC CRITERIA FOR AQUATIC WILDLIFE

Parameter	Aquatic Wildlife 3A	3B	3C	3D
PHYSICAL				
Total Dissolved Gases	(1)	(1)		
Minimum Dissolved Oxygen (MG/L) (2)				
30 Day Average	6.5	5.5	5.0	5.0
7 Day Average	9.5/5.0	6.0/4.0		
1 Day Average	8.0/4.0	5.0/3.0	3.0	3.0
Max. Temperature(C)(3)	20	27	27	
Max. Temperature Change (C)(3)	2	4	4	
pH (Range)	6.5-9.0	6.5-9.0	6.5-9.0	6.5-9.0
Turbidity Increase (NTU)	10	10	15	15
METALS (4) (DISSOLVED, UG/L)(5)				
Aluminum				
4 Day Average (6)	87	87	87	87
1 Hour Average	750	750	750	750
Arsenic (Trivalent)				
4 Day Average	150	150	150	150
1 Hour Average	340	340	340	340
Cadmium (7)				
4 Day Average	0.25	0.25	0.25	0.25
1 Hour Average	2.0	2.0	2.0	2.0
Chromium (Hexavalent)				
4 Day Average	11	11	11	11
1 Hour Average	16	16	16	16
Chromium (Trivalent) (7)				
4 Day Average	74	74	74	74
1 Hour Average	570	570	570	570
Copper (7)				
4 Day Average	9	9	9	9
1 Hour Average	13	13	13	13
Cyanide (Free)				
4 Day Average	5.2	5.2	5.2	
1 Hour Average	22	22	22	22
Iron (Maximum)	1000	1000	1000	1000
Lead (7)				

4 Day Average	2.5	2.5	2.5	2.5
1 Hour Average	65	65	65	65
Mercury				
4 Day Average	0.012	0.012	0.012	0.012
1 Hour Average	2.4	2.4	2.4	2.4
Nickel (7)				
4 Day Average	52	52	52	52
1 Hour Average	468	468	468	468
Selenium				
4 Day Average	4.6	4.6	4.6	4.6
1 Hour Average	18.4	18.4	18.4	18.4
Silver				
1 Hour Average (7)	1.6	1.6	1.6	1.6
Zinc (7)				
4 Day Average	120	120	120	120
1 Hour Average	120	120	120	120
INORGANICS (MG/L) (4)				
Total Ammonia as N (9)				
30 Day Average	(9a)	(9a)		
1 Hour Average	(9b)	(9b)	(9b)	(9b)
Chlorine (Total Residual)				
4 Day Average	0.011	0.011	0.011	0.011
1 Hour Average	0.019	0.019	0.019	0.019
Hydrogen Sulfide (13)				
(Undissociated, Max. UG/L)	2.0	2.0	2.0	2.0
Phenol (Maximum)	0.01	0.01	0.01	0.01
RADIOLOGICAL (MAXIMUM pCi/L)				
Gross Alpha (10)	15	15	15	15
ORGANICS (UG/L) (4)				
Aldrin				
1 Hour Average	1.5	1.5	1.5	1.5
Chlordane				
4 Day Average	0.0043	0.0043	0.0043	0.0043
1 Hour Average	1.2	1.2	1.2	1.2
4,4' -DDT				
4 Day Average	0.0010	0.0010	0.0010	0.0010
1 Hour Average	0.55	0.55	0.55	0.55
Dieldrin				
4 Day Average	0.056	0.056	0.056	0.056
1 Hour Average	0.24	0.24	0.24	0.24
Alpha-Endosulfan				
4 Day Average	0.056	0.056	0.056	0.056
1 Hour Average	0.11	0.11	0.11	0.11
beta-Endosulfan				
4 Day Average	0.056	0.056	0.056	0.056
1 Day Average	0.11	0.11	0.11	0.11
Endrin				
4 Day Average	0.036	0.036	0.036	0.036
1 Hour Average	0.086	0.086	0.086	0.086
Heptachlor				

4 Day Average	0.0038	0.0038	0.0038	0.0038
1 Hour Average	0.26	0.26	0.26	0.26
Heptachlor epoxide				
4 Day Average	0.0038	0.0038	0.0038	0.0038
1 Hour Average	0.26	0.26	0.26	0.26
Hexachlorocyclohexane (Lindane)				
4 Day Average	0.08	0.08	0.08	0.08
1 Hour Average	1.0	1.0	1.0	1.0
Methoxychlor (Maximum)	0.03	0.03	0.03	0.03
Mirex (Maximum)	0.001	0.001	0.001	0.001
Parathion				
4 Day Average	0.013	0.013	0.013	0.013
1 Hour Average	0.066	0.066	0.066	0.066
PCB's				
4 Day Average	0.014	0.014	0.014	0.014
Pentachlorophenol (11)				
4 Day Average	15	15	15	15
1 Hour Average	19	19	19	19
Toxaphene				
4 Day Average	0.0002	0.0002	0.0002	0.0002
1 Hour Average	0.73	0.73	0.73	0.73
POLLUTION INDICATORS (11)				
Gross Beta (pCi/L)	50	50	50	50
BOD (MG/L)	5	5	5	5
Nitrate as N (MG/L)	4	4	4	
Total Phosphorus as P (MG/L) (12)	0.05	0.05		

FOOTNOTES:

(1) Not to exceed 110% of saturation.

(2) These limits are not applicable to lower water levels in deep impoundments. First number in column is for when early life stages are present, second number is for when all other life stages present.

(3) The temperature standard shall be at background where it can be shown that natural or un-alterable conditions prevent its attainment. In such cases rulemaking will be undertaken to modify the standard accordingly.

Site Specific Standards for Temperature

Ken's Lake: From June 1st - September 20th, 27 degrees C.

(4) Where criteria are listed as 4-day average and 1-hour average concentrations, these concentrations should not be exceeded more often than once every three years on the average.

(5) The dissolved metals method involves filtration of the sample in the field, acidification of the sample in the field, no digestion process in the laboratory, and analysis by atomic absorption spectrophotometry or inductively coupled plasma (ICP).

(6) The criterion for aluminum will be implemented as follows:

Where the pH is equal to or greater than 7.0 and the hardness is equal to or greater than 50 ppm as $CaCO_3$ in the receiving water after mixing, the 87 ug/l chronic criterion (expressed as total recoverable) will not apply, and aluminum will be regulated based on compliance with the 750 ug/l acute aluminum criterion (expressed as total recoverable).

(7) Hardness dependent criteria. 100 mg/l used. Conversion factors for ratio of total recoverable metals to dissolved metals must also be applied. In waters with a hardness greater than 400 mg/l as $CaCO_3$, calculations will assume a hardness of 400 mg/l as $CaCO_3$. See Table 2.14.3 for complete equations for hardness and conversion factors.

(8) Reserved

(9) The following equations are used to calculate Ammonia criteria concentrations:

(9a) The thirty-day average concentration of total ammonia nitrogen (in mg/l as N) does not exceed, more than once every three years on the average, the chronic criterion calculated using the following equations.

Fish Early Life Stages are Present:

$$\text{mg/l as N (Chronic)} = ((0.0577/1+10^{7.688-pH}) + (2.487/1+10^{pH-7.688})) * \text{MIN}(2.85,\ 1.45*10^{0.028*(25-T)})$$

Fish Early Life Stages are Absent:

$$\text{mg/l as N (Chronic)} = ((0.0577/1+10^{7.688-pH}) + (2.487/1+10^{pH-7.688})) * 1.45*10^{0.028*(25-MAX(T,7))}$$

(9b) The one-hour average concentration of total ammonia nitrogen (in mg/l as N) does not exceed, more than once every three years on the average the acute criterion calculated using the following equations.

Class 3A:

$$\text{mg/l as N (Acute)} = (0.275/(1+10^{7.204-pH})) + (39.0/1+10^{pH-7.204}))$$

Class 3B, 3C, 3D:

$$\text{mg/l as N (Acute)} = 0.411/(1+10^{7.204-pH})) + (58.4/(1+10^{pH-7.204}))$$

In addition, the highest four-day average within the 30-day period should not exceed 2.5 times the chronic criterion. The "Fish Early Life Stages are Present" 30-day average total ammonia criterion will be applied by default unless it is determined by the Division, on a site-specific basis, that it is appropriate to apply the "Fish Early Life Stages are Absent" 30-day average criterion for all or some portion of the year. At a minimum, the "Fish Early Life Stages are Present" criterion will apply from the beginning of spawning through the end of the early life stages. Early life stages include the pre-hatch embryonic stage, the post-hatch free embryo or yolk-sac fry stage, and the larval stage for the species of fish expected to occur at the site. The division will consult with the Division of Wildlife Resources in making such determinations. The Division will maintain information regarding the waterbodies and time periods where application of the "Early Life Stages are Absent" criterion is determined to be appropriate.

(10) Investigation should be conducted to develop more information where these levels are exceeded.

(11) pH dependent criteria. pH 7.8 used in table. See

Table 2.14.4 for equation.

(12) Total Phosphorus as P (mg/l) indicator for lakes and reservoirs shall be 0.025.

(13) Formula to convert dissolved sulfide to un-disassociated hydrogen sulfide is: H_2S = Dissolved Sulfide * $e^{((-1.92 + pH) + 12.05)}$

TABLE
1-HOUR AVERAGE (ACUTE) CONCENTRATION OF
TOTAL AMMONIA AS N (MG/L)

pH	Class 3A	Class 3B, 3C, 3D
6.5	32.6	48.8
6.6	31.3	46.8
6.7	29.8	44.6
6.8	28.1	42.0
6.9	26.2	39.1
7.0	24.1	36.1
7.1	22.0	32.8
7.2	19.7	29.5
7.3	17.5	26.2
7.4	15.4	23.0
7.5	13.3	19.9
7.6	11.4	17.0
7.7	9.65	14.4
7.8	8.11	12.1
7.9	6.77	10.1
8.0	5.62	8.40
8.1	4.64	6.95
8.2	3.83	5.72
8.3	3.15	4.71
8.4	2.59	3.88
8.5	2.14	3.20
8.6	1.77	2.65
8.7	1.47	2.20
8.8	1.23	1.84
8.9	1.04	1.56
9.0	0.89	1.32

TABLE
30-DAY AVERAGE (CHRONIC) CONCENTRATION OF
TOTAL AMMONIA AS N (MG/l)

Fish Early Life Stages Present
Temperature, C

pH	0	14	16	18	20	22	24	26	28	30
6.5	6.67	6.67	6.06	5.33	4.68	4.12	3.62	3.18	2.80	2.46
6.6	6.57	6.57	5.97	5.25	4.61	4.05	3.56	3.13	2.75	2.42
6.7	6.44	6.44	5.86	5.15	4.52	3.98	3.50	3.07	2.70	2.37
6.8	6.29	6.29	5.72	5.03	4.42	3.89	3.42	3.00	2.64	2.32
6.9	6.12	6.12	5.56	4.89	4.30	3.78	3.32	2.92	2.57	2.25
7.0	5.91	5.91	5.37	4.72	4.15	3.65	3.21	2.82	2.48	2.18
7.1	5.67	5.67	5.15	4.53	3.98	3.50	3.08	2.70	2.38	2.09

7.2	5.39	5.39	4.90	4.31	3.78	3.33	2.92	2.57	2.26	1.99
7.3	5.08	5.08	4.61	4.06	3.57	3.13	2.76	2.42	2.13	1.87
7.4	4.73	4.73	4.30	3.78	3.32	2.92	2.57	2.26	1.98	1.74
7.5	4.36	4.36	3.97	3.49	3.06	2.69	2.37	2.08	1.83	1.61
7.6	3.98	3.98	3.61	3.18	2.79	2.45	2.16	1.90	1.67	1.47
7.7	3.58	3.58	3.25	2.86	2.51	2.21	1.94	1.71	1.50	1.32
7.8	3.18	3.18	2.89	2.54	2.23	1.96	1.73	1.52	1.33	1.17
7.9	2.80	2.80	2.54	2.24	1.96	1.73	1.52	1.33	1.17	1.03
8.0	2.43	2.43	2.21	1.94	1.71	1.50	1.32	1.16	1.02	0.90
8.1	2.10	2.10	1.91	1.68	1.47	1.29	1.14	1.00	0.88	0.77
8.2	1.79	1.79	1.63	1.43	1.26	1.11	0.97	0.86	0.75	0.66
8.3	1.52	1.52	1.39	1.22	1.07	0.94	0.83	0.73	0.64	0.56
8.4	1.29	1.29	1.17	1.03	0.91	0.80	0.70	0.62	0.54	0.48
8.5	1.09	1.09	0.99	0.87	0.76	0.67	0.59	0.52	0.46	0.40
8.6	0.92	0.92	0.84	0.73	0.65	0.57	0.50	0.44	0.39	0.34
8.7	0.78	0.78	0.71	0.62	0.55	0.48	0.42	0.37	0.33	0.29
8.8	0.66	0.66	0.60	0.53	0.46	0.41	0.36	0.32	0.28	0.24
8.9	0.56	0.56	0.51	0.45	0.40	0.35	0.31	0.27	0.24	0.21
9.0	0.49	0.49	0.44	0.39	0.34	0.30	0.26	0.23	0.20	0.18

TABLE
30-DAY AVERAGE (CHRONIC) CONCENTRATION OF
TOTAL AMMONIA AS N (MG/l)

Fish Early Life Stages Absent

Temperature, C

pH	0-7	8	9	10	11	12	13	14	16
6.5	10.8	10.1	9.51	8.92	8.36	7.84	7.36	6.89	6.06
6.6	10.7	10.1	9.37	9.37	8.79	8.24	7.72	7.24	6.36
6.7	10.5	9.99	9.20	8.62	8.08	7.58	7.11	6.66	5.86
6.8	10.2	9.81	8.98	8.42	7.90	7.40	6.94	6.51	5.72
6.9	9.93	9.31	8.73	8.19	7.68	7.20	6.75	6.33	5.56
7.0	9.60	9.00	8.43	7.91	7.41	6.95	6.52	6.11	5.37
7.1	9.20	8.63	8.09	7.58	7.11	6.67	6.25	5.86	5.15
7.2	8.75	8.20	7.69	7.21	6.76	6.34	5.94	5.57	4.90
7.3	8.24	7.73	7.25	6.79	6.37	5.97	5.60	5.25	4.61
7.4	7.69	7.21	6.76	6.33	5.94	5.57	5.22	4.89	4.30
7.5	7.09	6.64	6.23	5.84	5.48	5.13	4.81	4.51	3.97
7.6	6.46	6.05	5.67	5.32	4.99	4.68	4.38	4.11	3.61
7.7	5.81	5.45	5.11	4.79	4.49	4.21	3.95	3.70	3.25
7.8	5.17	4.84	4.54	4.26	3.99	3.74	3.51	3.29	2.89
7.9	4.54	4.26	3.99	3.74	3.51	3.29	3.09	2.89	2.54
8.0	3.95	3.70	3.47	3.26	3.05	2.86	2.68	2.52	2.21
8.1	3.41	3.19	2.99	2.81	2.63	2.47	2.31	2.17	1.91
8.2	2.91	2.73	2.56	2.40	2.25	2.11	1.98	1.85	1.63
8.3	2.47	2.32	2.18	2.04	1.91	1.79	1.68	1.58	1.39
8.4	2.09	1.96	1.84	1.73	1.62	1.52	1.42	1.33	1.17
8.5	1.77	1.66	1.55	1.46	1.37	1.28	1.20	1.13	0.990
8.6	1.49	1.40	1.31	1.23	1.15	1.08	1.01	0.951	0.836
8.7	1.26	1.18	1.11	1.04	0.976	0.915	0.858	0.805	0.707
8.8	1.07	1.01	0.944	0.885	0.829	0.778	0.729	0.684	0.601
8.9	0.917	0.860	0.806	0.758	0.709	0.664	0.623	0.584	0.513

9.0	0.790	0.740	.694	0.651	0.610	0.572	0.536	0.503	0.442

pH	18	20	22	24	26	28	30
6.5	5.33	4.68	4.12	3.62	3.18	2.80	2.46
6.6	5.25	4.61	4.05	3.56	3.13	2.75	2.42
6.7	5.15	4.52	3.98	3.50	3.07	2.70	2.37
6.8	5.03	4.42	3.89	3.42	3.00	2.64	2.32
6.9	4.89	4.30	3.78	3.32	2.92	2.57	2.25
7.0	4.72	4.15	3.65	3.21	2.82	2.48	2.18
7.1	4.53	3.98	3.50	3.08	2.70	2.38	2.09
7.2	4.41	3.78	3.33	2.92	2.57	2.26	1.99
7.3	4.06	3.57	3.13	2.76	2.42	2.13	1.87
7.4	3.78	3.32	2.92	2.57	2.26	1.98	1.74
7.5	3.49	3.06	2.69	2.37	2.08	1.83	1.61
7.6	3.18	2.79	2.45	2.16	1.90	1.67	1.47
7.7	2.86	2.51	2.21	1.94	1.71	1.50	1.32
7.8	2.54	2.23	1.96	1.73	1.52	1.33	1.17
7.9	2.24	1.96	1.73	1.52	1.33	1.17	1.03
8.0	0.94	1.71	1.50	1.32	1.16	1.02	0.897
8.1	0.68	1.47	1.29	1.14	1.00	0.879	0.733
8.2	0.43	1.26	1.11	0.073	0.855	0.752	0.661
8.3	0.22	1.07	0.941	0.827	0.727	0.639	0.562
8.4	0.03	0.906	0.796	0.700	0.615	0.541	0.475
8.5	0.870	0.765	0.672	0.591	0.520	0.457	0.401
8.6	0.735	0.646	0.568	0.499	0.439	0.396	0.339
8.7	0.622	0.547	0.480	0.422	0.371	0.326	0.287
8.8	0.528	0.464	0.408	0.359	0.315	0.277	0.244
8.9	0.451	0.397	0.349	0.306	0.269	0.237	0.208
9.0	0.389	0.342	0.300	0.264	0.232	0.204	0.179

APPENDIX D

STANDARDS AND SPECIFICATIONS FOR SELECTED BMPs

4.1 Source Control BMPs

BMP C101: Preserving Natural Vegetation

Purpose

The purpose of preserving natural vegetation is to reduce erosion wherever practicable. Limiting site disturbance is the single most effective method for reducing erosion. For example, conifers can hold up to about 50 percent of all rain that falls during a storm. Up to 20-30 percent of this rain may never reach the ground but is taken up by the tree or evaporates. Another benefit is that the rain held in the tree can be released slowly to the ground after the storm.

Conditions of Use

- Natural vegetation should be preserved on steep slopes, near perennial and intermittent watercourses or swales, and on building sites in wooded areas.
- As required by local governments.

Design and Installation Specifications

Natural vegetation can be preserved in natural clumps or as individual trees, shrubs and vines.

The preservation of individual plants is more difficult because heavy equipment is generally used to remove unwanted vegetation. The points to remember when attempting to save individual plants are:

- Is the plant worth saving? Consider the location, species, size, age, vigor, and the work involved. Local governments may also have ordinances to save natural vegetation and trees.
- Fence or clearly mark areas around trees that are to be saved. It is preferable to keep ground disturbance away from the trees at least as far out as the dripline.

Plants need protection from three kinds of injuries:

- *Construction Equipment* - This injury can be above or below the ground level. Damage results from scarring, cutting of roots, and compaction of the soil. Placing a fenced buffer zone around plants to be saved prior to construction can prevent construction equipment injuries.
- *Grade Changes* - Changing the natural ground level will alter grades, which affects the plant's ability to obtain the necessary air, water, and minerals. Minor fills usually do not cause problems although sensitivity between species does vary and should be checked. Trees can tolerate fill of 6 inches or less. For shrubs and other plants, the fill should be less.

  When there are major changes in grade, it may become necessary to supply air to the roots of plants. This can be done by placing a layer of gravel and a tile system over the roots before the fill is made. A tile system protects a tree from a raised grade. The tile system should be laid out on the original grade leading from a dry well around the tree trunk. The system should then be covered with small stones to allow air to circulate over the root area.

Lowering the natural ground level can seriously damage trees and shrubs. The highest percentage of the plant roots are in the upper 12 inches of the soil and cuts of only 2-3 inches can cause serious injury. To protect the roots it may be necessary to terrace the immediate area around the plants to be saved. If roots are exposed, construction of retaining walls may be needed to keep the soil in place. Plants can also be preserved by leaving them on an undisturbed, gently sloping mound. To increase the chances for survival, it is best to limit grade changes and other soil disturbances to areas outside the dripline of the plant.

- *Excavations* - Protect trees and other plants when excavating for drainfields, power, water, and sewer lines. Where possible, the trenches should be routed around trees and large shrubs. When this is not possible, it is best to tunnel under them. This can be done with hand tools or with power augers. If it is not possible to route the trench around plants to be saved, then the following should be observed:

  Cut as few roots as possible. When you have to cut, cut clean. Paint cut root ends with a wood dressing like asphalt base paint.

  Backfill the trench as soon as possible.

  Tunnel beneath root systems as close to the center of the main trunk to preserve most of the important feeder roots.

Some problems that can be encountered with a few specific trees are:

- Maple, Dogwood, Red alder, Western hemlock, Western red cedar, and Douglas fir do not readily adjust to changes in environment and special care should be taken to protect these trees.
- The windthrow hazard of Pacific silver fir and madronna is high, while that of Western hemlock is moderate. The danger of windthrow increases where dense stands have been thinned. Other species (unless they are on shallow, wet soils less than 20 inches deep) have a low windthrow hazard.
- Cottonwoods, maples, and willows have water-seeking roots. These can cause trouble in sewer lines and infiltration fields. On the other hand, they thrive in high moisture conditions that other trees would not.
- Thinning operations in pure or mixed stands of Grand fir, Pacific silver fir, Noble fir, Sitka spruce, Western red cedar, Western hemlock,

Pacific dogwood, and Red alder can cause serious disease problems. Disease can become established through damaged limbs, trunks, roots, and freshly cut stumps. Diseased and weakened trees are also susceptible to insect attack.

Maintenance Standards

- Inspect flagged and/or fenced areas regularly to make sure flagging or fencing has not been removed or damaged. If the flagging or fencing has been damaged or visibility reduced, it shall be repaired or replaced immediately and visibility restored.
- If tree roots have been exposed or injured, "prune" cleanly with an appropriate pruning saw or lopers directly above the damaged roots and recover with native soils. Treatment of sap flowing trees (fir, hemlock, pine, soft maples) is not advised as sap forms a natural healing barrier.

BMP C102: Buffer Zones

Purpose

An undisturbed area or strip of natural vegetation or an established suitable planting that will provide a living filter to reduce soil erosion and runoff velocities.

Conditions of Use

Natural buffer zones are used along streams, wetlands and other bodies of water that need protection from erosion and sedimentation. Vegetative buffer zones can be used to protect natural swales and can be incorporated into the natural landscaping of an area.

Critical-areas buffer zones should not be used as sediment treatment areas. These areas shall remain completely undisturbed. The local permitting authority may expand the buffer widths temporarily to allow the use of the expanded area for removal of sediment.

Design and Installation Specifications

- Preserving natural vegetation or plantings in clumps, blocks, or strips is generally the easiest and most successful method.
- Leave all unstable steep slopes in natural vegetation.
- Mark clearing limits and keep all equipment and construction debris out of the natural areas. Steel construction fencing is the most effective method in protecting sensitive areas and buffers. Alternatively, wire-backed silt fence on steel posts is marginally effective. Flagging alone is typically not effective.
- Keep all excavations outside the dripline of trees and shrubs.
- Do not push debris or extra soil into the buffer zone area because it will cause damage from burying and smothering.
- Vegetative buffer zones for streams, lakes or other waterways shall be established by the local permitting authority or other state or federal permits or approvals.

Maintenance Standards

- Inspect the area frequently to make sure flagging remains in place and the area remains undisturbed.

BMP C105: Stabilized Construction Entrance

Purpose

Construction entrances are stabilized to reduce the amount of sediment transported onto paved roads by vehicles or equipment by constructing a stabilized pad of quarry spalls at entrances to construction sites.

Conditions of Use

Construction entrances shall be stabilized wherever traffic will be leaving a construction site and traveling on paved roads or other paved areas within 1,000 feet of the site.

On large commercial, highway, and road projects, the designer should include enough extra materials in the contract to allow for additional stabilized entrances not shown in the initial Construction SWPPP. It is difficult to determine exactly where access to these projects will take place; additional materials will enable the contractor to install them where needed.

Design and Installation Specifications

- See Figure 4.2 for details. Note: the 100' minimum length of the entrance shall be reduced to the maximum practicable size when the size or configuration of the site does not allow the full length (100').
- A separation geotextile shall be placed under the spalls to prevent fine sediment from pumping up into the rock pad. The geotextile shall meet the following standards:

Grab Tensile Strength (ASTM D4751)	200 psi min.
Grab Tensile Elongation (ASTM D4632)	30% max.
Mullen Burst Strength (ASTM D3786-80a)	400 psi min.
AOS (ASTM D4751)	20-45 (U.S. standard sieve size)

- Consider early installation of the first lift of asphalt in areas that will paved; this can be used as a stabilized entrance. Also consider the installation of excess concrete as a stabilized entrance. During large concrete pours, excess concrete is often available for this purpose.
- Hog fuel (wood-based mulch) may be substituted for or combined with quarry spalls in areas that will not be used for permanent roads. Hog fuel is generally less effective at stabilizing construction entrances and should be used only at sites where the amount of traffic is very limited. Hog fuel is not recommended for entrance stabilization in urban areas. The effectiveness of hog fuel is highly variable and it generally requires more maintenance than quarry spalls. The inspector may at any time require the use of quarry spalls if the hog fuel is not preventing sediment from being tracked onto pavement or if the hog fuel is being carried onto pavement. Hog fuel is prohibited in permanent roadbeds because organics in the subgrade soils cause degradation of the subgrade support over time.
- Fencing (see BMPs C103 and C104) shall be installed as necessary to restrict traffic to the construction entrance.

- Whenever possible, the entrance shall be constructed on a firm, compacted subgrade. This can substantially increase the effectiveness of the pad and reduce the need for maintenance.

Maintenance Standards

- Quarry spalls (or hog fuel) shall be added if the pad is no longer in accordance with the specifications.
- If the entrance is not preventing sediment from being tracked onto pavement, then alternative measures to keep the streets free of sediment shall be used. This may include street sweeping, an increase in the dimensions of the entrance, or the installation of a wheel wash.
- Any sediment that is tracked onto pavement shall be removed by shoveling or street sweeping. The sediment collected by sweeping shall be removed or stabilized on site. The pavement shall not be cleaned by washing down the street, except when sweeping is ineffective and there is a threat to public safety. If it is necessary to wash the streets, the construction of a small sump shall be considered. The sediment would then be washed into the sump where it can be controlled.
- Any quarry spalls that are loosened from the pad, which end up on the roadway shall be removed immediately.
- If vehicles are entering or exiting the site at points other than the construction entrance(s), fencing (see BMPs C103 and C104) shall be installed to control traffic.
- Upon project completion and site stabilization, all construction accesses intended as permanent access for maintenance shall be permanently stabilized.

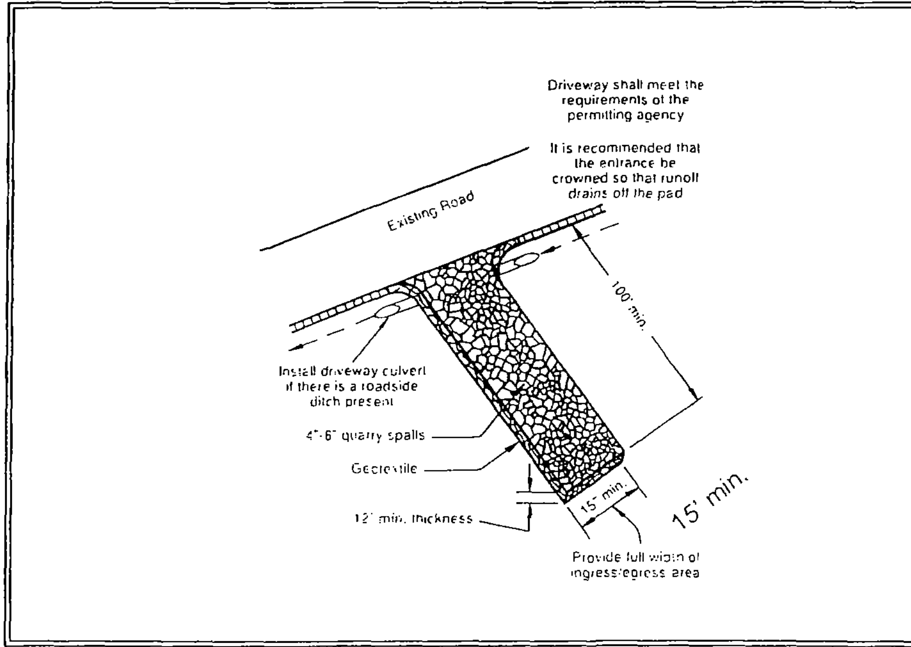


Figure 4.2 – Stabilized Construction Entrance

BMP C106: Wheel Wash

Purpose

Wheel washes reduce the amount of sediment transported onto paved roads by motor vehicles.

Conditions of Use

When a stabilized construction entrance (see BMP C105) is not preventing sediment from being tracked onto pavement.

- Wheel washing is generally an effective BMP when installed with careful attention to topography. For example, a wheel wash can be detrimental if installed at the top of a slope abutting a right-of-way where the water from the dripping truck can run unimpeded into the street.
- Pressure washing combined with an adequately sized and surfaced pad with direct drainage to a large 10-foot x 10-foot sump can be very effective.

Design and Installation Specifications

Suggested details are shown in Figure 4.3. The Local Permitting Authority may allow other designs. A minimum of 6 inches of asphalt treated base (ATB) over crushed base material or 8 inches over a good subgrade is recommended to pave the wheel wash.

Use a low clearance truck to test the wheel wash before paving. Either a belly dump or lowboy will work well to test clearance.

Keep the water level from 12 to 14 inches deep to avoid damage to truck hubs and filling the truck tongues with water.

Midpoint spray nozzles are only needed in extremely muddy conditions.

Wheel wash systems should be designed with a small grade change, 6 to 12 inches for a 10-foot-wide pond, to allow sediment to flow to the low side of pond to help prevent re-suspension of sediment. A drainpipe with a 2- to 3-foot riser should be installed on the low side of the pond to allow for easy cleaning and refilling. Polymers may be used to promote coagulation and flocculation in a closed-loop system. Polyacrylamide (PAM) added to the wheel wash water at a rate of 0.25 - 0.5 pounds per 1,000 gallons of water increases effectiveness and reduces cleanup time. If PAM is already being used for dust or erosion control and is being applied by a water truck, the same truck can be used to change the wash water.

Maintenance Standards

The wheel wash should start out the day with fresh water.

The wash water should be changed a minimum of once per day. On large earthwork jobs where more than 10-20 trucks per hour are expected, the wash water will need to be changed more often.

Wheel wash or tire bath wastewater shall be discharged to a separate on-site treatment system, such as closed-loop recirculation or land application, or to the sanitary sewer with proper local sewer district approval.

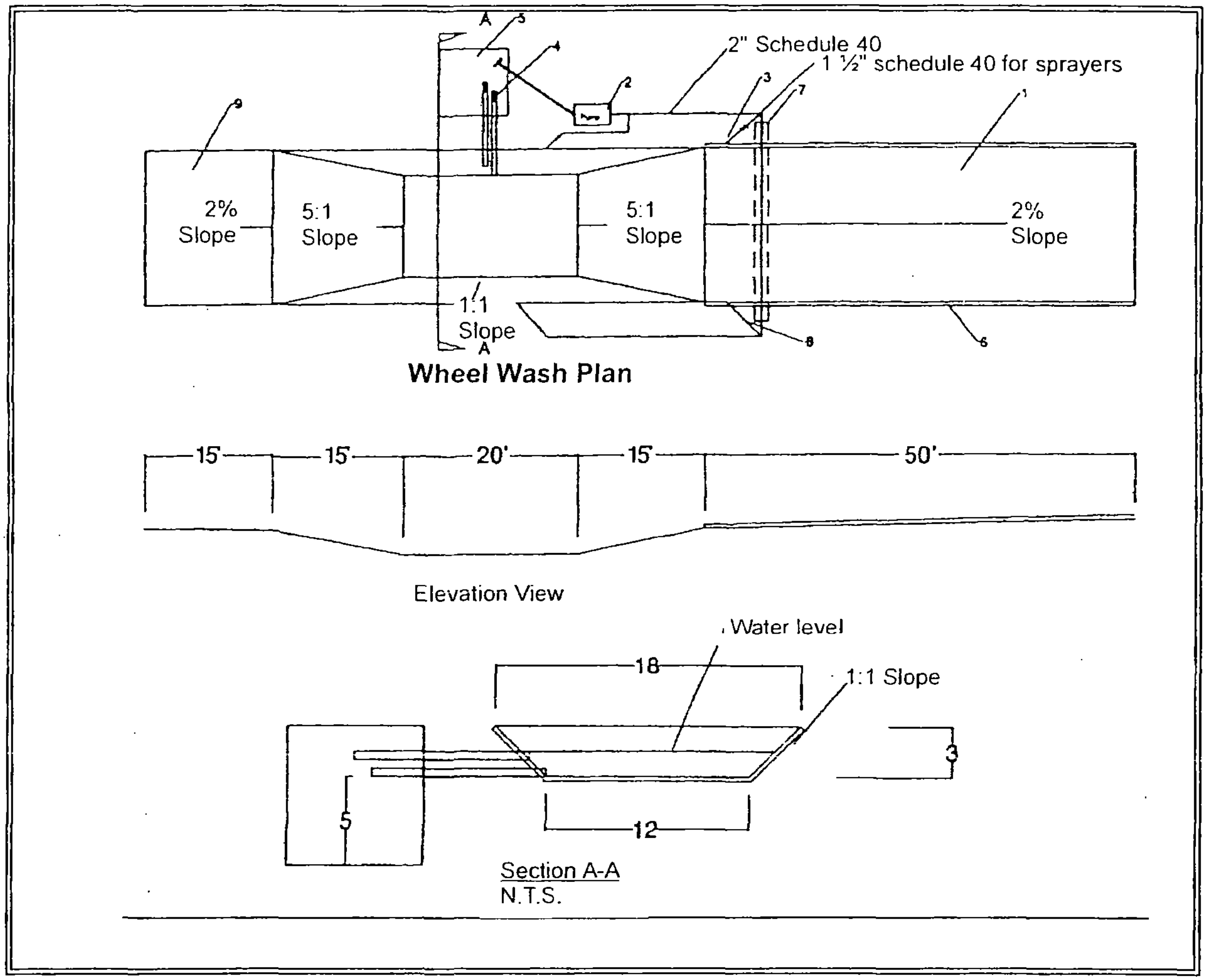


Figure 4.3 Wheel Wash

Notes:

1. Asphalt construction entrance 6 in. asphalt treated base (ATB).
2. 3-inch trash pump with floats on the suction hose.
3. Midpoint spray nozzles, if needed.
4. 6-inch sewer pipe with butterfly valves. Bottom one is a drain. Locate top pipe's invert 1 foot above bottom of wheel wash.
5. 8 foot x 8 foot sump with 5 feet of catch. Build so can be cleaned with trackhoe.
6. Asphalt curb on the low road side to direct water back to pond.
7. 6-inch sleeve under road.
8. Ball valves.
9. 15 foot. ATB apron to protect ground from splashing water.

BMP C123: Plastic Covering

Purpose

Plastic covering provides immediate, short-term erosion protection to slopes and disturbed areas.

Conditions of Use

- Plastic covering may be used on disturbed areas that require cover measures for less than 30 days, except as stated below.
- Plastic is particularly useful for protecting cut and fill slopes and stockpiles. Note: The relatively rapid breakdown of most polyethylene sheeting makes it unsuitable for long-term (greater than six months) applications.
- Clear plastic sheeting can be used over newly-seeded areas to create a greenhouse effect and encourage grass growth if the hydroseed was installed too late in the season to establish 75 percent grass cover, or if the wet season started earlier than normal. Clear plastic should not be used for this purpose during the summer months because the resulting high temperatures can kill the grass.
- Due to rapid runoff caused by plastic sheeting, this method shall not be used upslope of areas that might be adversely impacted by concentrated runoff. Such areas include steep and/or unstable slopes.
- While plastic is inexpensive to purchase, the added cost of installation, maintenance, removal, and disposal make this an expensive material, up to $1.50-2.00 per square yard.
- Whenever plastic is used to protect slopes, water collection measures must be installed at the base of the slope. These measures include plastic-covered berms, channels, and pipes used to covey clean rainwater away from bare soil and disturbed areas. At no time is clean runoff from a plastic covered slope to be mixed with dirty runoff from a project.
- Other uses for plastic include:

  1. Temporary ditch liner;
  2. Pond liner in temporary sediment pond;
  3. Liner for bermed temporary fuel storage area if plastic is not reactive to the type of fuel being stored;
  4. Emergency slope protection during heavy rains; and,
  5. Temporary drainpipe ("elephant trunk") used to direct water.

Design and Installation Specifications

- Plastic slope cover must be installed as follows:
  1. Run plastic up and down slope, not across slope;
  2. Plastic may be installed perpendicular to a slope if the slope length is less than 10 feet;
  3. Minimum of 8-inch overlap at seams;
  4. On long or wide slopes, or slopes subject to wind, all seams should be taped;
  5. Place plastic into a small (12-inch wide by 6-inch deep) slot trench at the top of the slope and backfill with soil to keep water from flowing underneath;
  6. Place sand filled burlap or geotextile bags every 3 to 6 feet along seams and pound a wooden stake through each to hold them in place;
  7. Inspect plastic for rips, tears, and open seams regularly and repair immediately. This prevents high velocity runoff from contacting bare soil which causes extreme erosion;
  8. Sandbags may be lowered into place tied to ropes. However, all sandbags must be staked in place.
- Plastic sheeting shall have a minimum thickness of 0.06 millimeters.
- If erosion at the toe of a slope is likely, a gravel berm, riprap, or other suitable protection shall be installed at the toe of the slope in order to reduce the velocity of runoff.

Maintenance Standards

- Torn sheets must be replaced and open seams repaired.
- If the plastic begins to deteriorate due to ultraviolet radiation, it must be completely removed and replaced.
- When the plastic is no longer needed, it shall be completely removed.
- Dispose of old tires appropriately.

Erosion Control, Improved

Increased Efficiency

Easily applied with conventional hydraulic seeding equipment, which is less expensive than blankets or erosion-control netting. ENVIRO-SHIELD bonded fiber matrix is the only Easy-Lawn approved BFM that can be used via jet agitation mixing from an Easy Lawn TURFMASTER® series 350-600 Gallon Hydroseeder, as well as larger units from all hydraulic seeding machine manufacturers.

Improved Soil Quality

Only ENVIRO-SHIELD bonded fiber matrix is made from gypsum, which supplies calcium, sulfur and other nutrients to the soil. Gypsum also improves the structure of high clay content soils, buffers soil pH and helps drive sodium out of the root profile in areas where high soil sodium is a problem.

Safe

Totally biodegradable and harmless to fish, birds, plants and animals, ENVIRO-SHIELD bonded fiber matrix is easily applied where steep slopes or inaccessible terrain make the installation of blankets difficult. Where public safety is a concern, especially around retail or school areas, there are no 'staples' (typically used with sod or erosion control blankets) that turn into dangerous projectiles when mowed.

Economical

Whether steep slopes, open tracts or narrow embankments, effective coverage is achieved at recommended application rates of just 3,500 pounds of product (70 bags) per acre. With less ground preparation and less labor than a roll-out or sod blanket application, ENVIRO-SHIELD bonded fiber matrix is up to 30% less expensive than other erosion control methods.

Long-Lasting

Meeting or exceeding the erosion qualities of temporary erosion control blankets, ENVIRO-SHIELD bonded fiber matrix's blend of fiber and bonding ingredients creates a crust that enhances germination by protecting the seed to promote plant growth.

Effective

Special water-holding ingredients improve the retention of moisture from rain-water, facilitating quick and effective germination of plant cover.

Versatile

Can be used for roadway and airport runway shoulders, golf courses, oil, drilling, construction, mining, industrial and cement manufacturing sites, feedlots, landfills, power stations, and new or existing housing developments.

Technical Data

- Can be mixed at 70 (+/– 10 lbs.) per 100 gallons of water
- Packaging net weight is 50 lb. bales
- One truckload equals 840 bales or 24 pallets (40"x48" pallet)

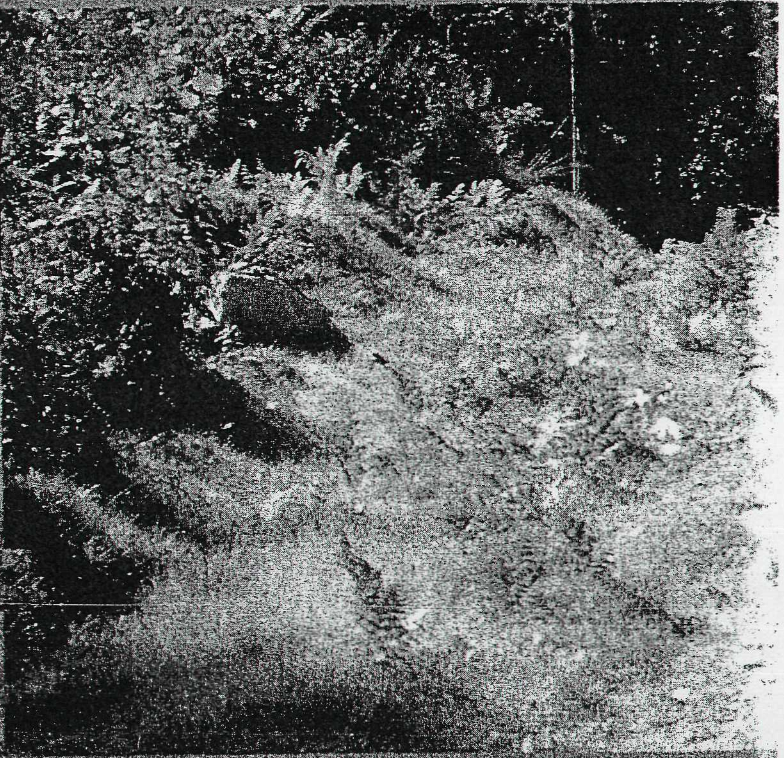
Typical Application Rates

Area	Pounds/AC
< 3:1 slope	3000 lbs/ac
3:1 to 2:1	3500 lbs/ac
> 2:1 slope	4000 lbs/ac

Components

ENVIRO-SHIELD bonded fiber matrix contains the following biodegradable and environmentally safe ingredients:

- A gypsum-based binder
- Cellulosic fiber mulch (paper/soft wood)
- Specially developed plant-based tackifiers (short-term binding agents)
- Nonpetroleum-based polymers (long-term binding agents)
- Surfactant
- Water-holding ingredients, (polyacrylmides (PAM))
- Dye (green)



BMP C130: Surface Roughening

Purpose

Surface roughening aids in the establishment of vegetative cover, reduces runoff velocity, increases infiltration, and provides for sediment trapping through the provision of a rough soil surface. Horizontal depressions are created by operating a tiller or other suitable equipment on the contour or by leaving slopes in a roughened condition by not fine grading them.

Conditions for Use

- All slopes steeper than 3:1 and greater than 5 vertical feet require surface roughening.
- Areas with grades steeper than 3:1 should be roughened to a depth of 2 to 4 inches prior to seeding.
- Areas that will not be stabilized immediately may be roughened to reduce runoff velocity until seeding takes place.
- Slopes with a stable rock face do not require roughening.
- Slopes where mowing is planned should not be excessively roughened.

Design and Installation Specifications

There are different methods for achieving a roughened soil surface on a slope, and the selection of an appropriate method depends upon the type of slope. Roughening methods include stair-step grading, grooving, contour furrows, and tracking. See Figure 4.6 for tracking and contour furrows. Factors to be considered in choosing a method are slope steepness, mowing requirements, and whether the slope is formed by cutting or filling.

- Disturbed areas that will not require mowing may be stair-step graded, grooved, or left rough after filling.
- Stair-step grading is particularly appropriate in soils containing large amounts of soft rock. Each "step" catches material that sloughs from above, and provides a level site where vegetation can become established. Stairs should be wide enough to work with standard earth moving equipment. Stair steps must be on contour or gullies will form on the slope.
- Areas that will be mowed (these areas should have slopes less steep than 3:1) may have small furrows left by disking, harrowing, raking, or seed-planting machinery operated on the contour.
- Graded areas with slopes greater than 3:1 but less than 2:1 should be roughened before seeding. This can be accomplished in a variety of ways, including "track walking," or driving a crawler tractor up and down the slope, leaving a pattern of cleat imprints parallel to slope contours.
- Tracking is done by operating equipment up and down the slope to leave horizontal depressions in the soil.

Maintenance Standards

- Areas that are graded in this manner should be seeded as quickly as possible.
- Regular inspections should be made of the area. If rills appear, they should be re-graded and re-seeded immediately.

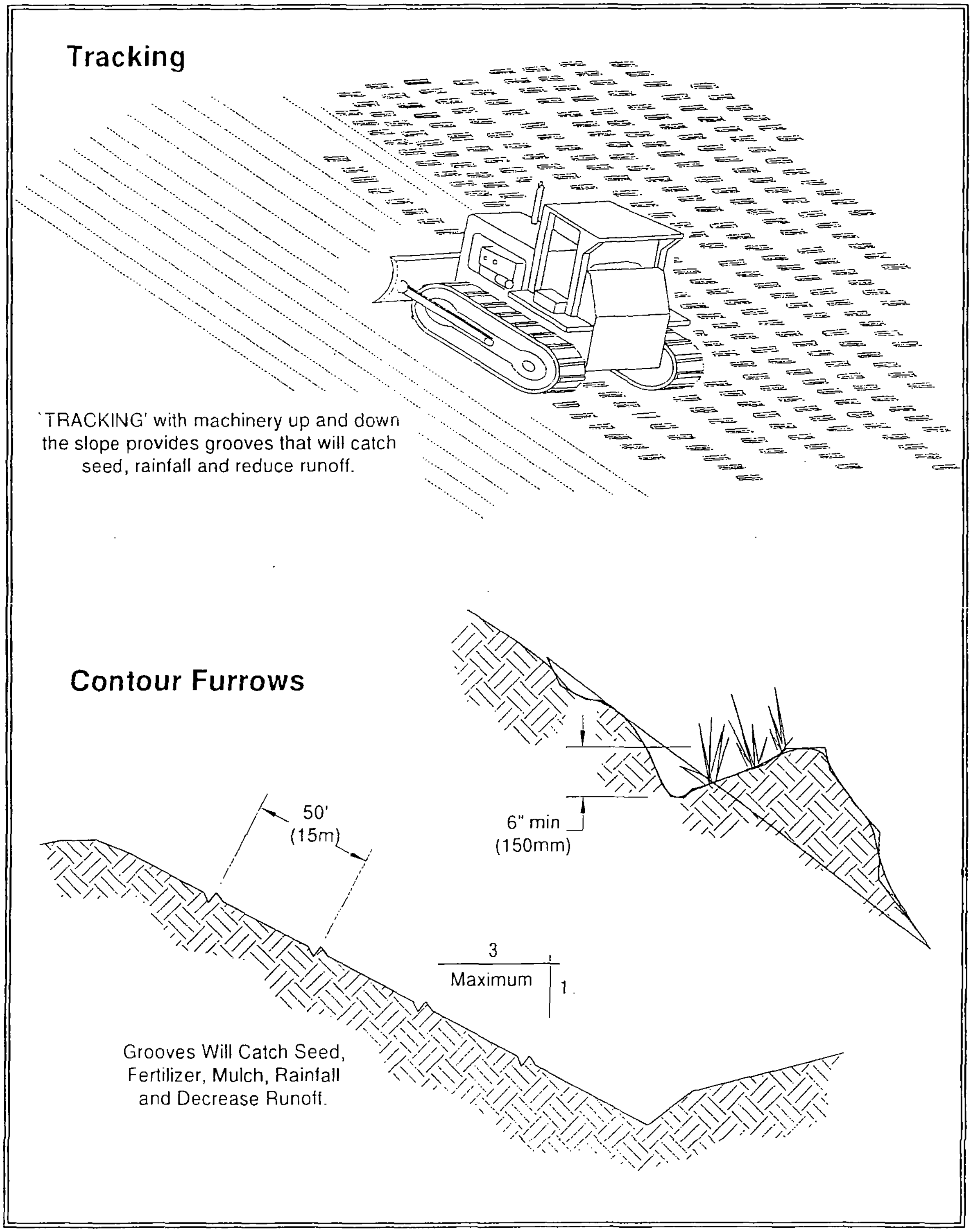


Figure 4.6 – Surface Roughening by Tracking and Contour Furrows

BMP C131: Gradient Terraces

Purpose

Gradient terraces reduce erosion damage by intercepting surface runoff and conducting it to a stable outlet at a non-erosive velocity.

Conditions of Use

- Gradient terraces normally are limited to denuded land having a water erosion problem. They should not be constructed on deep sands or on soils that are too stony, steep, or shallow to permit practical and economical installation and maintenance. Gradient terraces may be used only where suitable outlets are or will be made available. See Figure 4.7 for gradient terraces.

Design and Installation Specifications

- The maximum spacing of gradient terraces should be determined by the following method:

  $$VI = (0.8)s + y$$

  Where: VI = vertical interval in feet

  s = land rise per 100 feet, expressed in feet

  y = a soil and cover variable with values from 1.0 to 4.0

  Values of "y" are influenced by soil erodibility and cover practices. The lower values are applicable to erosive soils where little to no residue is left on the surface. The higher value is applicable only to erosion-resistant soils where a large amount of residue (1½ tons of straw/acre equivalent) is on the surface.

- The minimum constructed cross-section should meet the design dimensions.

- The top of the constructed ridge should not be lower at any point than the design elevation plus the specified overfill for settlement. The opening at the outlet end of the terrace should have a cross section equal to that specified for the terrace channel.

- Channel grades may be either uniform or variable with a maximum grade of 0.6 feet per 100 feet length. For short distances, terrace grades may be increased to improve alignment. The channel velocity should not exceed that which is nonerosive for the soil type with the planned treatment.

- All gradient terraces should have adequate outlets. Such an outlet may be a grassed waterway, vegetated area, or tile outlet. In all cases the outlet must convey runoff from the terrace or terrace system to a point where the outflow will not cause damage. Vegetative cover should be used in the outlet channel.

- The design elevation of the water surface of the terrace should not be lower than the design elevation of the water surface in the outlet at their junction, when both are operating at design flow.

- Vertical spacing determined by the above methods may be increased as much as 0.5 feet or 10 percent, whichever is greater, to provide better alignment or location, to avoid obstacles, to adjust for equipment size, or to reach a satisfactory outlet.
- The drainage area above the top should not exceed the area that would be drained by a terrace with normal spacing.
- The terrace should have enough capacity to handle the peak runoff expected from a 2-year, 24-hour design storm without overtopping.
- The terrace cross-section should be proportioned to fit the land slope. The ridge height should include a reasonable settlement factor. The ridge should have a minimum top width of 3 feet at the design height. The minimum cross-sectional area of the terrace channel should be 8 square feet for land slopes of 5 percent or less, 7 square feet for slopes from 5 to 8 percent, and 6 square feet for slopes steeper than 8 percent. The terrace can be constructed wide enough to be maintained using a small cat.

Maintenance Standards

- Maintenance should be performed as needed. Terraces should be inspected regularly; at least once a year, and after large storm events.

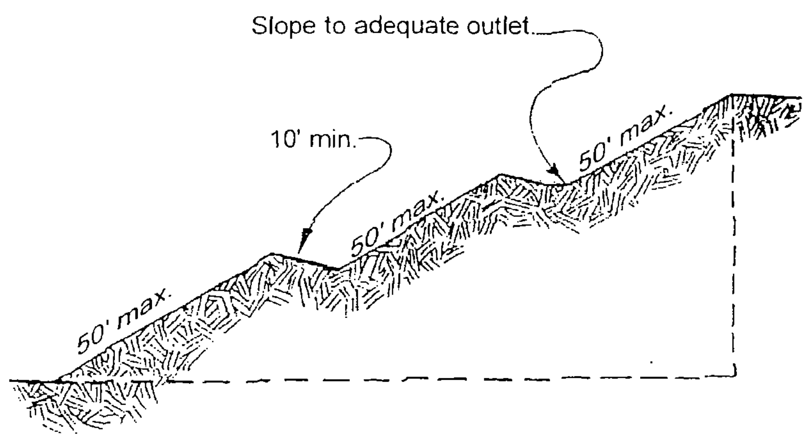


Figure 4.7 - Gradient Terraces

BMP C209: Outlet Protection

Purpose

Outlet protection prevents scour at conveyance outlets and minimizes the potential for downstream erosion by reducing the velocity of concentrated stormwater flows.

Conditions of use

Outlet protection is required at the outlets of all ponds, pipes, ditches, or other conveyances, and where runoff is conveyed to a natural or manmade drainage feature such as a stream, wetland, lake, or ditch.

Design and Installation Specifications

The receiving channel at the outlet of a culvert shall be protected from erosion by rock lining a minimum of 6 feet downstream and extending up the channel sides a minimum of 1-foot above the maximum tailwater elevation or 1-foot above the crown, whichever is higher. For large pipes (more than 18 inches in diameter), the outlet protection lining of the channel is lengthened to four times the diameter of the culvert.

- Standard wingwalls, and tapered outlets and paved channels should also be considered when appropriate for permanent culvert outlet protection. (See WSDOT Hydraulic Manual, available through WSDOT Engineering Publications).
- Organic or synthetic erosion blankets, with or without vegetation, are usually more effective than rock, cheaper, and easier to install. Materials can be chosen using manufacturer product specifications. ASTM test results are available for most products and the designer can choose the correct material for the expected flow.
- With low flows, vegetation (including sod) can be effective.
- The following guidelines shall be used for riprap outlet protection:
    1. If the discharge velocity at the outlet is less than 5 fps (pipe slope less than 1 percent), use 2-inch to 8-inch riprap. Minimum thickness is 1-foot.
    2. For 5 to 10 fps discharge velocity at the outlet (pipe slope less than 3 percent), use 24-inch to 4-foot riprap. Minimum thickness is 2 feet.
    3. For outlets at the base of steep slope pipes (pipe slope greater than 10 percent), an engineered energy dissipater shall be used.
- Filter fabric or erosion control blankets should always be used under riprap to prevent scour and channel erosion.
- New pipe outfalls can provide an opportunity for low-cost fish habitat improvements. For example, an alcove of low-velocity water can be created by constructing the pipe outfall and associated energy dissipater back from the stream edge and digging a channel, over-widened to the upstream side, from the outfall. Overwintering juvenile and migrating adult salmonids may use the alcove as shelter during

high flows. Bank stabilization, bioengineering, and habitat features may be required for disturbed areas. See Volume V for more information on outfall system design.

Maintenance Standards

- Inspect and repair as needed.
- Add rock as needed to maintain the intended function.
- Clean energy dissipater if sediment builds up.

BMP C233: Silt Fence

Purpose

Use of a silt fence reduces the transport of coarse sediment from a construction site by providing a temporary physical barrier to sediment and reducing the runoff velocities of overland flow. See Figure 4.19 for details on silt fence construction.

Conditions of Use

Silt fence may be used downslope of all disturbed areas.

- Silt fence is not intended to treat concentrated flows, nor is it intended to treat substantial amounts of overland flow. Any concentrated flows must be conveyed through the drainage system to a sediment pond. The only circumstance in which overland flow can be treated solely by a silt fence, rather than by a sediment pond, is when the area draining to the fence is one acre or less and flow rates are less than 0.5 cfs.
- Silt fences should not be constructed in streams or used in V-shaped ditches. They are not an adequate method of silt control for anything deeper than sheet or overland flow.

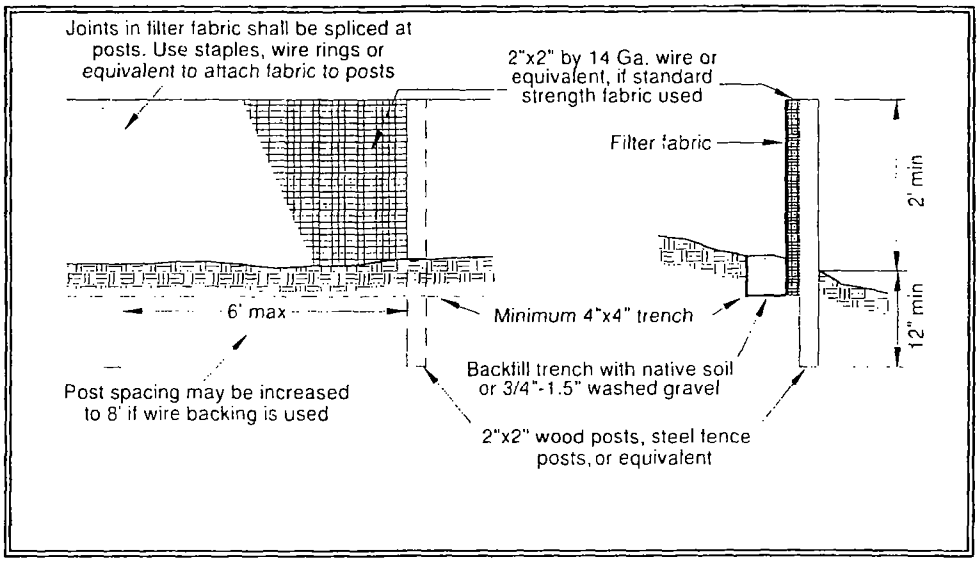


Figure 4.19 – Silt Fence

Design and Installation Specifications

- Drainage area of 1 acre or less or in combination with sediment basin in a larger site.
- Maximum slope steepness (normal (perpendicular) to fence line) 1:1.
- Maximum sheet or overland flow path length to the fence of 100 feet.
- No flows greater than 0.5 cfs.
- The geotextile used shall meet the following standards. All geotextile properties listed below are minimum average roll values (i.e., the test result for any sampled roll in a lot shall meet or exceed the values shown in Table 4.10):

Table 4.10 Geotextile Standards	
Polymeric Mesh AOS (ASTM D4751)	0.60 mm maximum for slit film wovens (#30 sieve). 0.30 mm maximum for all other geotextile types (#50 sieve). 0.15 mm minimum for all fabric types (#100 sieve).
Water Permittivity (ASTM D4491)	0.02 sec^{-1} minimum
Grab Tensile Strength (ASTM D4632)	180 lbs. Minimum for extra strength fabric. 100 lbs minimum for standard strength fabric.
Grab Tensile Strength (ASTM D4632)	30% maximum
Ultraviolet Resistance (ASTM D4355)	70% minimum

- Standard strength fabrics shall be supported with wire mesh, chicken wire, 2-inch x 2-inch wire, safety fence, or jute mesh to increase the strength of the fabric. Silt fence materials are available that have synthetic mesh backing attached.
- Filter fabric material shall contain ultraviolet ray inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0°F. to 120°F.
- 100 percent biodegradable silt fence is available that is strong, long lasting, and can be left in place after the project is completed, if permitted by local regulations.
- Standard Notes for construction plans and specifications follow. Refer to Figure 4.19 for standard silt fence details.

  The contractor shall install and maintain temporary silt fences at the locations shown in the Plans. The silt fences shall be constructed in the areas of clearing, grading, or drainage prior to starting those activities. A silt fence shall not be considered temporary if the silt fence must function beyond the life of the contract. The silt fence shall prevent soil carried by runoff water from going beneath, through, or over the top of the silt fence, but shall allow the water to pass through the fence.

  The minimum height of the top of silt fence shall be 2 feet and the maximum height shall be 2½ feet above the original ground surface.

  The geotextile shall be sewn together at the point of manufacture, or at an approved location as determined by the Engineer, to form geotextile lengths as required. All sewn seams shall be located at a support post. Alternatively, two sections of silt fence can be overlapped, provided the Contractor can demonstrate, to the satisfaction of the Engineer, that the overlap is long enough and that the adjacent fence sections are close enough together to prevent silt laden water from escaping through the fence at the overlap.

The geotextile shall be attached on the up-slope side of the posts and support system with staples, wire, or in accordance with the manufacturer's recommendations. The geotextile shall be attached to the posts in a manner that reduces the potential for geotextile tearing at the staples, wire, or other connection device. Silt fence back-up support for the geotextile in the form of a wire or plastic mesh is dependent on the properties of the geotextile selected for use. If wire or plastic back-up mesh is used, the mesh shall be fastened securely to the up-slope of the posts with the geotextile being up-slope of the mesh back-up support.

The geotextile at the bottom of the fence shall be buried in a trench to a minimum depth of 4 inches below the ground surface. The trench shall be backfilled and the soil tamped in place over the buried portion of the geotextile, such that no flow can pass beneath the fence and scouring can not occur. When wire or polymeric back-up support mesh is used, the wire or polymeric mesh shall extend into the trench a minimum of 3 inches.

The fence posts shall be placed or driven a minimum of 18 inches. A minimum depth of 12 inches is allowed if topsoil or other soft subgrade soil is not present and a minimum depth of 18 inches cannot be reached. Fence post depths shall be increased by 6 inches if the fence is located on slopes of 3:1 or steeper and the slope is perpendicular to the fence. If required post depths cannot be obtained, the posts shall be adequately secured by bracing or guying to prevent overturning of the fence due to sediment loading.

Silt fences shall be located on contour as much as possible, except at the ends of the fence, where the fence shall be turned uphill such that the silt fence captures the runoff water and prevents water from flowing around the end of the fence.

If the fence must cross contours, with the exception of the ends of the fence, gravel check dams placed perpendicular to the back of the fence shall be used to minimize concentrated flow and erosion along the back of the fence. The gravel check dams shall be approximately 1-foot deep at the back of the fence. It shall be continued perpendicular to the fence at the same elevation until the top of the check dam intercepts the ground surface behind the fence. The gravel check dams shall consist of crushed surfacing base course, gravel backfill for walls, or shoulder ballast. The gravel check dams shall be located every 10 feet along the fence where the fence must cross contours. The slope of the fence line where contours must be crossed shall not be steeper than 3:1.

Wood, steel or equivalent posts shall be used. Wood posts shall have minimum dimensions of 2 inches by 2 inches by 3 feet minimum length, and shall be free of defects such as knots, splits, or gouges.

Steel posts shall consist of either size No. 6 rebar or larger, ASTM A 120 steel pipe with a minimum diameter of 1-inch, U, T, L, or C shape steel posts with a minimum weight of 1.35 lbs./ft. or other steel posts having equivalent strength and bending resistance to the post sizes listed. The spacing of the support posts shall be a maximum of 6 feet.

Fence back-up support, if used, shall consist of steel wire with a maximum mesh spacing of 2 inches, or a prefabricated polymeric mesh. The strength of the wire or polymeric mesh shall be equivalent to or greater than 180 lbs. grab tensile strength. The polymeric mesh must be as resistant to ultraviolet radiation as the geotextile it supports.

- Silt fence installation using the slicing method specification details follow. Refer to Figure 4.20 for slicing method details.

The base of both end posts must be at least 2 to 4 inches above the top of the silt fence fabric on the middle posts for ditch checks to drain properly. Use a hand level or string level, if necessary, to mark base points before installation.

Install posts 3 to 4 feet apart in critical retention areas and 6 to 7 feet apart in standard applications.

Install posts 24 inches deep on the downstream side of the silt fence, and as close as possible to the fabric, enabling posts to support the fabric from upstream water pressure.

Install posts with the nipples facing away from the silt fence fabric.

Attach the fabric to each post with three ties, all spaced within the top 8 inches of the fabric. Attach each tie diagonally 45 degrees through the fabric, with each puncture at least 1 inch vertically apart. In addition, each tie should be positioned to hang on a post nipple when tightening to prevent sagging.

Wrap approximately 6 inches of fabric around the end posts and secure with 3 ties.

No more than 24 inches of a 36-inch fabric is allowed above ground level.

The rope lock system must be used in all ditch check applications.

The installation should be checked and corrected for any deviation before compaction. Use a flat-bladed shovel to tuck fabric deeper into the ground if necessary.

Compaction is vitally important for effective results. Compact the soil immediately next to the silt fence fabric with the front wheel of the tractor, skid steer, or roller exerting at least 60 pounds per square inch. Compact the upstream side first and then each side twice for a total of four trips.

Maintenance Standards

- Any damage shall be repaired immediately.
- If concentrated flows are evident uphill of the fence, they must be intercepted and conveyed to a sediment pond.
- It is important to check the uphill side of the fence for signs of the fence clogging and acting as a barrier to flow and then causing channelization of flows parallel to the fence. If this occurs, replace the fence or remove the trapped sediment.
- Sediment deposits shall either be removed when the deposit reaches approximately one-third the height of the silt fence, or a second silt fence shall be installed.
- If the filter fabric (geotextile) has deteriorated due to ultraviolet breakdown, it shall be replaced.

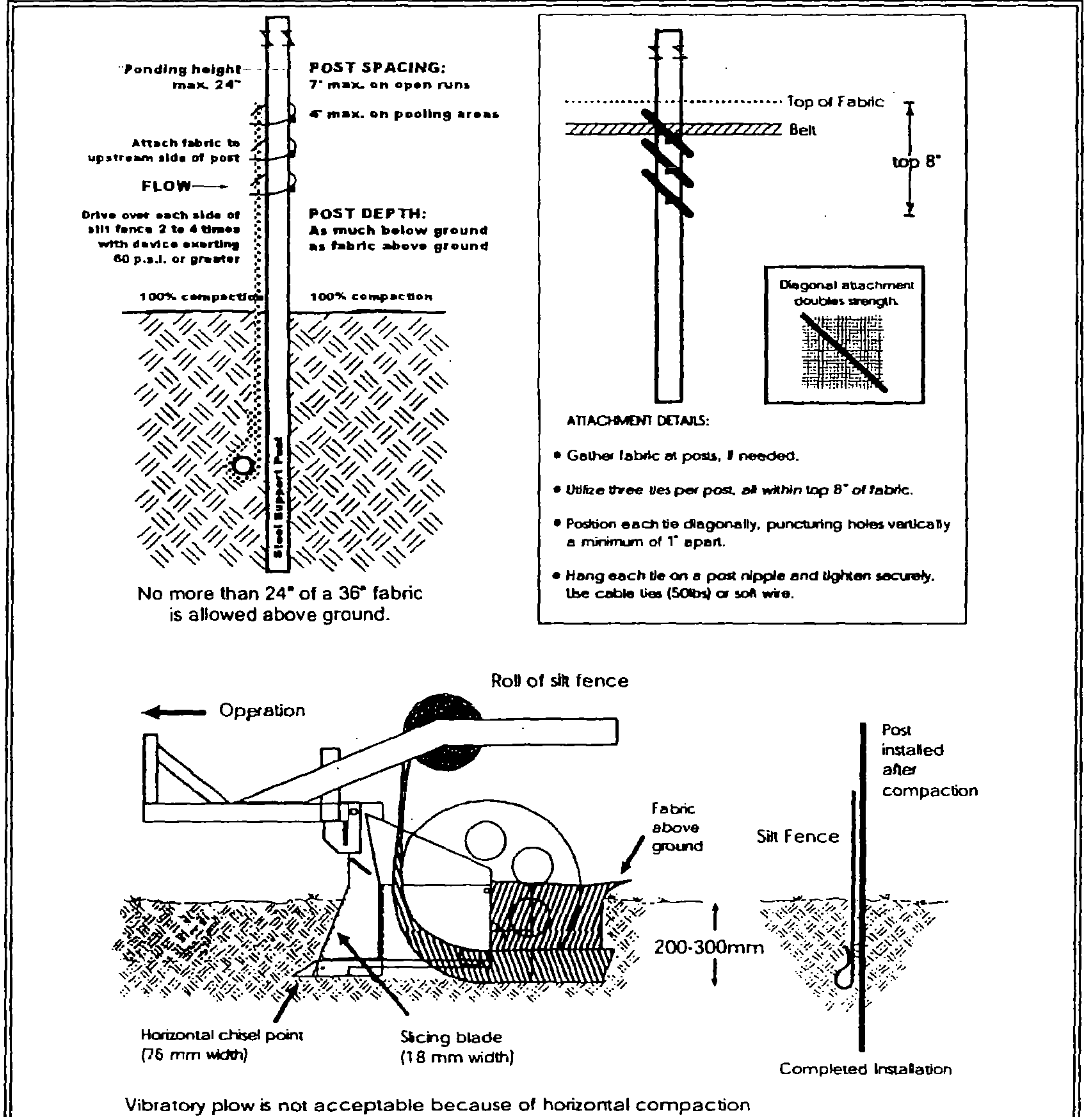


Figure 4.20 – Silt Fence Installation by Slicing Method

APPENDIX E

MATERIAL SAFETY DATA SHEETS

MATERIAL SAFETY DATA SHEET
USG ENVIRO-SHIELD™ Brand Bonded Fiber Matrix

United States Gypsum Company
125 South Franklin Street
Chicago, Illinois 60606-4678
A Subsidiary of USG Corporation

Product Safety: 1 (800) 507-8899
www.usg.com
Version Date: December 21, 2004
Version: 1

SECTION 1
CHEMICAL PRODUCT AND IDENTIFICATION

PRODUCT(S): USG ENVIRO-SHIELD™ Bonded Fiber Matrix
CHEMICAL FAMILY: Paper and Wood Fibers, Calcium Sulfate Hemihydrate ($CaSO_4 \bullet ½H_2O$) and Guar Gum

SECTION 2
COMPOSITION, INFORMATION ON INGREDIENTS

MATERIAL	WT%	TLV (mg/m^3)	PEL(mg/m^3)	CAS NUMBER
Cellulosic Fiber (Paper/ Soft Wood)	<75	10	15(T)/5(R)	9004-34-6
Plaster of Paris (CaSO4•½H2O)	>20	10	15(T)/5(R)	26499-65-0
Guar Gum	<5	10	15(T)/5(R)	7783-20-2
Crystalline Silica	<1	0.05(R)	0.1(R)	14808-60-7

(T) – Total (R) – Respirable (NE) – Not Established
Respirable crystalline silica: IARC: Group 1 carcinogen, NTP: Known human carcinogen. The weight percent of crystalline silica given represents total quartz and not the respirable fraction. Testing of dust from USG plaster of paris has not detected respirable crystalline silica.

FDA Food and Drug Administration [CFR Title 21, v.3, sec 184.1230] – Calcium Sulfate is Generally Recognized as Safe (GRAS).

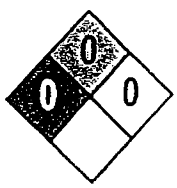
FDA Food and Drug Administration [CFR Title 21, v.3, sec 184. 1339] – Guar Gum is Generally Recognized as Safe (GRAS).

All ingredients of this product are included in the U.S. Environmental Protection Agency's Toxic Substances Control Act Chemical Substance Inventory. All components of this product are included in the Canadian Domestic Substances List (DSL)

SECTION 3
HAZARD IDENTIFICATION

INFORMATION FOR HANDLING AND IDENTIFICATION OF CHEMICAL HAZARDS

NFPA Ratings:
Health: 0
Fire: 0
Reactivity: 0



HIMS Ratings:
Health: *0
Fire: 0
Reactivity: 1

HEALTH	*	0
FLAMMABILITY		0
PHYSICAL HAZARD		1
PERSONAL PROTECTION		E

0 = Minimal Hazard
1 = Slight Hazard
2 = Moderate Hazard
3 = Serious Hazard
4 = Severe Hazard

Personal Protection: Use eye and skin protection. Use NIOSH/MSHA-approved respiratory protection when necessary.
*Respirable crystalline silica can cause lung disease and/or cancer. E – Safety glasses, gloves and dust respirator

EMERGENCY OVERVIEW
This product is not expected to produce any unusual hazards during normal use. Exposure to high dust levels may irritate the skin, eyes, nose, throat, or upper respiratory tract. When mixed with water, this material hardens and becomes very hot – sometimes quickly. **DO NOT** attempt to make a cast enclosing any part of the body using this material.

SECTION 3 HAZARD IDENTIFICATION (continued)

POTENTIAL HEALTH EFFECTS

ACUTE:

Eyes: Direct contact can cause mechanical irritation of eyes. If burning, redness, itching, pain or other symptoms persist or develop, consult physician.

Skin: When mixed with water, this material hardens and becomes very hot – sometimes quickly. **DO NOT** attempt to make a cost enclosing any part of the body using this material. Failure to follow these instructions can cause severe burns that may require surgical removal of affected tissue or amputation of limb. Direct, prolonged or repeated contact with the skin may cause irritation. Rinse with water until skin is free of material to avoid irritation, then wash skin thoroughly with mild soap and water. Repeated exposure may dry skin.

Inhalation: Dust exposures generated during the handling of the product may irritate eyes, skin, nose, throat, and upper respiratory tract. Persons subjected to large amounts of this dust will be forced to leave area because of nuisance conditions such as coughing, sneezing and nasal irritation. Labored breathing may occur after excessive inhalation. Occupational asthma has been reported for workers in the industrial production of guar gum. If respiratory symptoms persist, consult physician.

Ingestion: Guar gum is a natural food additive, although direct use in food in powder or pill form is banned by the FDA due to the risk of respiratory or gastrointestinal blockage. Swallowing small amounts of powder could result in the material swelling in throat, possibly causing blockage of the throat and choking. Plaster of paris, may also cause gastric disturbances if swallowed. Plaster of paris is non-toxic, however, ingestion of a sufficient quantity could lead to mechanical obstruction of the gut, especially the pyloric region. See First Aid Measures - Ingestion (Section 4).

CHRONIC:

Raw guar contains natural proteins that can cause allergic reactions such as asthma and rhinitis. Processed guar, such as this product, contains far less protein and therefore has a lower risk of sensitization. Occupational asthma has been reported for workers in the industrial production of guar gum.

Inhalation: Testing of dust from USG plaster of paris has not detected respirable crystalline silica. Exposures to respirable crystalline silica are not expected during the normal use of this product; however, actual levels must be determined by workplace hygiene testing. The weight percent of respirable crystalline silica has not been measured in this product.

The wood fiber in this product is from a soft wood, primarily pine. Wood dust, depending on species (including pine), may cause respiratory sensitization.

Prolonged and repeated exposure to airborne free respirable crystalline silica can result in lung disease (i.e., silicosis) and/or lung cancer. The development of silicosis may increase the risks of additional health effects. The risk of developing silicosis is dependent upon the exposure intensity and duration.

Skin: The wood fiber in this product is from a soft wood, primarily pine. Wood dust, depending on species (including pine), may cause irritation and/or dermatitis on prolonged, repetitive contact.

Repeated contact to plaster of paris may dry the skin, causing cracking or dermatitis. Sensitive individuals may develop an allergic dermatitis.

Eyes: No known effects.

Ingestion: No known effects.

TARGET ORGANS: Eyes, skin and respiratory system.

PRIMARY ROUTES OF ENTRY: Inhalation, eyes and skin contact.

SECTION 4
FIRST AID MEASURES

FIRST AID PROCEDURES:

Eyes: Flush thoroughly with water for 15 minutes. If irritation persists, consult physician.

Skin: Wash with mild soap and water. A commercially available hand lotion may be used to treat dry skin areas. If skin has become cracked, take appropriate action to prevent infection and promote healing. If irritation persists, consult physician.

SECTION 4 FIRST AID MEASURES (continued)

Inhalation: Remove to fresh air. Leave the area of dust exposure and remain away until coughing and other symptoms subside. Assure that the victim is breathing. If breathing is difficult, administer oxygen, if available. If victim is not breathing, administer CPR (cardiopulmonary resuscitation). Seek medical attention.

Ingestion: This product is not intended to be ingested or eaten. Swallowing small amounts of powder could result in the material swelling in throat, possibly causing blockage of the throat and choking. If the victim is conscious and alert, give 1-2 glasses of water to drink to prevent esophageal obstruction. Do not give anything by mouth to an unconscious person. Seek medical attention. Do not leave victim unattended. If gastric disturbance occurs, call physician. This product contains gypsum plaster. Plaster of paris hardens and, if ingested, may result in obstruction of the gut, especially the pyloric region.

MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED: Pre-existing upper respiratory and lung diseases such *as, but not limited to, bronchitis, emphysema and asthma. Pre-existing skin diseases such as, but not limited to,* rashes and dermatitis.

Notes to Physician: Treatment should be directed at the control of symptoms and the clinical condition.

SECTION 5
FIRE FIGHTING MEASURES

General Fire Hazards:	Greater than 200°F, non-combustible at standard temperature pressure, difficult to ignite.		
Extinguishing Media:	Water or use extinguishing media appropriate for surrounding fire.		
Special Fire Fighting Procedures:	Wear appropriate personal protective equipment (See section 8).		
Unusual Fire and Explosion Hazards:	None		
Hazardous Combustion Products:	Above 1450° C - decomposes to calcium oxide (CaO) and sulfur dioxide (SO_2).		
Flash Point:	None Known	**Auto Ignition:**	Not Applicable
Method Used:	Not Applicable	**Flammability Classification:**	Not Applicable, may act as a fire retardant
Upper Flammable Limit (UFL):	Not Applicable		
Lower Flammable Limit (LFL):	Not Applicable	**Rate of Burning:**	Not Applicable

SECTION 6
ACCIDENTAL RELEASE MEASURES

CONTAINMENT:

No special precautions. Wear appropriate personal protection (See Section 8).

CLEAN-UP:

Use normal clean up procedures. If dry, shovel or sweep up material from spillage and place collected material into a container for recovery or waste disposal. Avoid dust generation. Avoid inhalation of dust and contact with eyes and skin. Wear appropriate protective equipment. Maintain proper ventilation. If vacuum is used to collect dust, use an industrial vacuum cleaner with a high efficiency air filter. If sweeping is necessary, use dust suppressant. Do not use compressed air for clean up. These procedures will help minimize potential exposures. If washed down, may plug drains. If already mixed with water, scrape up and place in container.

DISPOSAL:

Follow all local, state, provincial and federal regulations. Never discharge large releases directly into sewers or surface waters. Slurry may plug drains. Trace amounts of residue can be flushed to a drain, using plenty of water.

SECTION 7
HANDLING AND STORAGE

HANDLING:

Avoid dust contact with eyes. Wear the appropriate eye protection against dust (See Section 8).

Avoid breathing dust. Wear the appropriate respiratory protection against dust in poorly ventilated areas and if TLV is exceeded (see Sections 2 and 8).

Minimize dust generation and accumulation. Use good safety and industrial hygiene practices.

Guar gum is a known dust explosion hazard. Guar gum comprises less than 5% of this product, the explosion hazard of this product has not been evaluated.

STORAGE:

Store in a cool, dry, ventilated area away from sources of heat, moisture and incompatibilities (see Section 10).

Dew point conditions or other conditions causing presence of liquid will harden this material during storage.

Protect product bags or containers from physical damage and weather.

Keep bags or other containers tightly closed to prevent moisture contact.

SECTION 8
EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS:

Provide ventilation sufficient to control airborne dust levels especially respirable crystalline silica.

If user operations generate airborne dust, use ventilation to keep dust concentrations below permissible exposure limits (See Section 2).

Where general ventilation is inadequate, use process enclosures, local exhaust ventilation, or other engineering controls to control dust levels below permissible exposure limits (see Section 2). If engineering controls are not possible, wear a properly fitted NIOSH/MSHA-approved particulate respirator.

RESPIRATORY PROTECTION:

Wear a NIOSH/MSHA-approved respirator equipped with particulate cartridges when dusty in poorly ventilated areas, and if TLV is exceeded. A respiratory program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use.

OTHER PERSONAL PROTECTIVE EQUIPMENT:

Eye/Face: Wear eye protection (safety glasses or goggles) to avoid possible eye irritation.

Skin: Wear gloves and protective clothing to prevent repeated or prolonged skin contact. Barrier creams or skin lotion may be applied to face, neck, wrist and hands when skin is exposed to help prevent drying of skin.

General: Selection of Personal Protective Equipment will depend on environmental working conditions and operations.

SECTION 9
PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Tan, grayish-green	**Viscosity**	Not Applicable
Physical State	Solid (mulched)	**Solubility (H2O)**	Insoluble, will disperse in water
Odor	Low to no odor	**Boiling Point**	Not Applicable
pH @ 25 ° C	~7	**Melting Point**	Not Applicable
Particle Size	Varies	**Softening Point**	Not Applicable
Molecular Weight	Mixture	**Freezing Point**	Not Applicable
Bulk Density	~ 0.97 g/cm	**Vapor Density (Air = 1)**	Not Applicable
Specific Gravity (H_20 = 1)	Not Determined	**Vapor Pressure (mm Hg)**	Not Applicable
Percent Volatile	None	**Evaporation Rate (BuAc = 1)**	Not Applicable
VOC Content	None		

MATERIAL SAFETY DATA SHEET
USG ENVIRO-SHIELD™ Brand Bonded Fiber Matrix

SECTION 10
CHEMICAL STABILITY AND REACTIVITY

STABILITY:	Stable in dry environments. Dew point conditions or other conditions causing presence of liquid will harden this material.
CONDITIONS TO AVOID:	Contact with acids, water, high humidity, and incompatibles. Dusting conditions, extreme heat, open flame and sparks.
INCOMPATIBILITY:	Acids. Exposure to water and acids must be supervised because the reactions are vigorous and produce large amounts of heat.
HAZARDOUS POLYMERIZATION:	Will not occur.
HAZARDOUS DECOMPOSITION:	Above 1450° C - calcium oxide (CaO) and sulfur dioxide SO_2

SECTION 11
TOXICOLOGICAL INFORMATION

ACUTE EFFECTS:

The sulfate ion has caused gastro-intestinal disturbance in humans following large oral doses.

Limited studies involving the repeated inhalation of an (unspecified) calcium sulfate failed to identify any particular target organs in monkeys, rats and hamsters.

No evidence of mutagenicity was found in Ames bacterial tests.

Plaster of paris:	Oral LD50 rat > 5000 mg/kg
	Dermal LD50 – None Determined
	Skin Irritation LD50 – None Determined
	Eye Irritation LD50– None Determined

LD_{50}: Not Available for product.

LC_{50}: Not Available for product.

CHRONIC EFFECTS / CARCINOGENICITY:

Wood dusts: The wood fiber in this product is from a soft wood, primarily pine. Wood dust, depending on species (including pine), may cause respiratory sensitization, irritation and/or dermatitis on prolonged, repetitive contact.

Crystalline silica: Testing of dust from USG plaster of paris has not detected respirable crystalline silica. Exposures to respirable crystalline silica are not expected during the normal use of this product; however, actual levels must be determined by workplace hygiene testing. The weight percent of respirable crystalline silica has not been measured in this product.

Prolonged and repeated exposure to airborne free respirable crystalline silica can result in lung disease (i.e., silicosis) and/or lung cancer. The development of silicosis may increase the risks of additional health effects. The risk of developing silicosis is dependent upon the exposure intensity and duration.

In June, 1997, IARC classified crystalline silica (quartz and cristobalite) as a human carcinogen. In making the overall evaluation, the IARC Working Group noted that carcinogenicity in humans was not detected in all industrial circumstances studied. Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs.

IARC states that crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (Group 1).

Nonylphenol Ethoxylates: Nonyl phenol ethoxylate is an alkylphenol ethoxylate, and this group of chemicals has come under increasing scrutiny as possible endocrine disrupters in wildlife. In laboratory tests nonylphenol ethoxylate (NPE) and its break down ethoxylates disrupt the endocrine systems of fish, birds, and mammals. They cause feminization and demasculinization of male fish, causing them to synthesize egg yolk protein. They caused a reduction in testicular size in rainbow trout. They also caused proliferation of estrogen sensitive human breast tumor cells. Trace amounts of 1,4 dioxane, ethylene oxide, acetaldehyde and formaldehyde may be associated with the production of nonylphenol ethoxylate. Any exposure to these substances is expected to remain well below OSHA regulatory and ACGIH recommended limits during normal handling and use of this product.

SECTION 12
ECOLOGICAL INFORMATION

ENVIRONMENTAL TOXICITY: This product has no known adverse effect on ecology.
Ecotoxicity value: Not determined.

SECTION 13
DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD:
Dispose of material in accordance with federal, state, and local regulations. Never discharge directly into sewers or surface waters. Consult with environmental regulatory agencies for guidance on acceptable disposal practices. Slurry may plug drains.

SECTION 14
TRANSPORT INFORMATION

U.S. DOT INFORMATION: Not a hazardous material per DOT shipping requirements. Not classified or regulated.

Shipping Name:	Same as product name.
Hazard Class:	Not classified
UN/NA #:	None. Not classified.
Packing Group:	None.
Label (s) Required:	Not applicable.
GGVSec/MDG-Code:	Not classified.
ICAO/IATA-DGR:	Not applicable.
RID/ADR:	None
ADNR:	None

SECTION 15
REGULATORY INFORMATION

UNITED STATES REGULATIONS
All ingredients of this product are included in the U.S. Environmental Protection Agency's Toxic Substances Control Act Chemical Substance Inventory.

MATERIAL	WT%	302	304	313	CERCLA	CAA Sec. 112	RCRA Code
Cellulosic Fiber (Paper/ Soft Wood)	<75	NL	NL	NL	NL	NL	NL
Plaster of Paris ($CaSO_4 \bullet \frac{1}{2}H_2O$)	>20	NL	NL	NL	NL	NL	NL
Guar Gum	<5	NL	NL	NL	NL	NL	NL
Crystalline Silica	<1	NL	NL	NL	NL	NL	NL

Key : NL = Not Listed
SARA Title III Section 302 (EPCRA) Extremely Hazardous Substances: Threshold Planning Quantity (TPQ)
SARA Title III Section 304 (EPCRA) Extremely Hazardous Substances: Reportable Quantity (RQ)
SARA Title III Section 313 (EPCRA) Toxic Chemicals: X= Subject to reporting under section 313
CERCLA Hazardous Substances: Reportable Quantity (RQ)
CAA Section 112 (r) Regulated Chemicals for Accidental Release Prevention: Threshold Quantities(TQ)
RCRA Hazardous Waste: RCRA hazardous waste code

SECTION 15 REGULATORY INFORMATION (continued)

FDA Food and Drug Administration [CFR Title 21, v.3, sec 184.1230] – Calcium Sulfate is Generally Recognized as Safe (GRAS).

FDA Food and Drug Administration [CFR Title 21, v.3, sec 184. 1339] – Guar Gum is Generally Recognized as Safe (GRAS).

CANADIAN REGULATIONS

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations. All components of this product are included in the Canadian Domestic Substances List (DSL).

MATERIAL	WT%	IDL Item #	WHMIS Classification:
Cellulosic Fiber (Paper/ Soft Wood)	<75	Not Listed	Not Listed
Plaster of Paris ($CaSO_4 \bullet ½H_2O$)	>20	Not Listed	Not Listed
Guar Gum	<5	Not Listed	Not Listed
Crystalline Silica	<1	1406	D2A

IDL Item#: Canadian Hazardous Products Act – Ingredient Disclosure List Item #

WHMIS Classification: Workplace Hazardous Material Information System

CARCINOGENICITY CLASSIFICATION OF INGREDIENT(S) All substances listed are associated with the nature of the raw materials used in the manufacture of this product and are not independent components of the product formulation. All substances, if present, are at levels well below regulatory limits. See Section 11 : Toxicology Information for detailed information

MATERIAL	IARC	NTP	ACGIH	CAL- 65
Respirable Crystalline Silica	1	1	A2	Listed
1, 4 Dioxane	2B	2	A3	Listed
Ethylene Oxide	1	1	A2	Listed
Acetaldehyde	2B	2	A3	Listed
Formaldehyde	1	2	A2	Listed

See Section 11 : Toxicology Information for detailed information

IARC – International Agency for Research on Cancer (World Health Organization)
1- Carcinogenic to humans
2A – Probably carcinogenic to humans
2B – Possibly carcinogenic to humans
3 - Not classifiable as a carcinogen
4 – Probably not a carcinogen

NTP – National Toxicology Program (Health and Human Services Dept., Public Health Service, NIH/NIEHS)
1- Known to be carcinogen
2- Anticipated to be carcinogens

ACGIH – American Conference of Governmental Industrial Hygienists
A1 – Confirmed human carcinogen
A2 – Suspected human carcinogen
A3 – Animal carcinogen
A4 - Not classifiable as a carcinogen
A5 – Not suspected as a human carcinogen

CAL-65 – California Proposition 65 "Chemicals known to the State of California to Cause Cancer"

SECTION 16
OTHER INFORMATION

Label Information:

△WARNING!

When mixed with water, this material hardens and becomes very hot – sometimes quickly. **DO NOT** attempt to make a cost enclosing any part of the body using this material. Failure to follow these instructions can cause severe burns that may require surgical removal of affected tissue or amputation of limb.
Dust created from product may cause eye, skin, nose, throat or upper respiratory irritation. Occupational asthma has been reported for workers in the industrial production of guar gum. Avoid inhalation of dust and eye contact. Use in a well-ventilated area. Wear a NIOSH/MSHA-approved respirator when dusty. Use proper ventilation to reduce dust exposure. Wear eye protection. If eye contact occurs, flush thoroughly with water for 15 minutes. If irritation persists, call physician. Wash thoroughly with soap and water after use. Do not ingest. If ingested, call physician.
Product safety information: (800) 507-8899 or www.usg.com
KEEP OUT OF REACH OF CHILDREN.

Key/Legend

TLV	Threshold Limit Value
PEL	Permissible Exposure Limit
CAS	Chemical Abstracts Service (Registry Number)
NIOSH	National Institute for Occupational Safety and Health
MSHA	Mine Safety and Health Administration
OSHA	Occupational Health and Safety Administration
ACGIH	American Conference of Governmental Industrial Hygienists
IARC	International Agency for Research on Cancer
DOT	United States Department of Transportation
EPA	United States Environmental Protection Agency
NFPA	National Fire Protection Association
HMIS	Hazardous Materials Identification System
PPE	Personal Protection Equipment
TSCA	Toxic Substances Control Act
DSL	Canadian Domestic Substances List
NDSL	Canadian Non-Domestic Substances List
SARA	Superfund Amendments and Reauthorization Act of 1986
CAA	Clean Air Act
EPCRA	Emergency Planning & Community Right-to-know Act
RCRA	Resource Conservation and Recovery Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act of 1980
UN/NA#	United Nations/North America number
CFR	Code of Federal Regulations
WHMIS	Workplace Hazardous Material Information System

Prepared by:
Product Safety
USG Corporation
125 South Franklin St.
Chicago, Illinois 60606

END

APPENDIX F

A SUMMARY OF ENVIRONMENTAL REGULATIONS REQUIRING IMMEDIATE TO WITHIN 24 HOUR NOTIFICATION AND CONTACT INFORMATION

A Summary of Utah State and Federal Hazardous Substance/Waste/Material Environmental Regulations Requiring Immediate to Within 24 Hour Notification of Utah DEQ or EPA

Regulation	When Required	Information Required	Notify Whom	Oral Notice Time	Phone Numbers	Written Notice Time
Air Quality						
R307-107.2	Air pollution control equipment breakdown > 2 hrs	Not specified	Div. of Air Quality.	3-18 hrs	536-4000 536-4123 (off hours)	7 days
40 CFR 58	Air pollution control malfunction	Not specified	State	24 hours	536-4000 536-4123 (off hours)	14 days
40 CFR 59	Monitoring system malfunctions	Not specified	State Air Program Director.	24 hours	536-4000 536-4123 (off hours)	14 days
40 CFR 52	When in violation of National Ambient Air Quality Standards	Not specified	State Air Program Director	24 hours	536-4000 536-4123 (off hours)	
Hazardous Waste/Material/Substance						
R315-9-1(b)	Spill of one kilogram of "acutely hazardous waste", which includes: 1 "P" wastes, 2 F999 wastes (chemical warfare agents), and 3 "F" wastes with a hazard code of "H" (identified in 40 CFR 261.31 and includes wastes from the production or use of chlorphenols and chlorobenzenes). Spill of 100 kilograms of other hazardous waste. Notify for a spill of a lesser quantity if there is a potential threat to human health or the environment.	Name, phone number, and address of responsible party. Name, title and phone of person reporting. Time and date of the spill. Spill location. Nearest town, city, highway or waterway. Waste description and amount. Cause. Extent of injuries. Potential hazards to human health or the environment. Estimated quantity and disposition of recovered material.	Div. of Solid & Hazardous Waste	Immediately	538-6170 536-4123 (off hours)	15 days
40 CFR 263 30	When a transporter spills a hazardous waste, immediate action must be taken to protect the environment, including notification of local authorities	Not specified	Div. of Solid & Hazardous Waste	Immediately	538-6170 536-4123 (off hours)	
CERCLA 103	Any CERCLA listed substance spilled over the reportable quantity into the environment	Name, phone number, and address of responsible party; name, title and phone of person reporting, time and date of the spill; spill location; nearest town, city, highway or waterway; waste description and amount, cause; action taken.	NRC	Immediately	1-800-424-8802	
40 CFR 302.6	Discharge of a hazardous substance in quantities greater than the reportable quantity over 24 hours	Not specified	NRC	Immediately	1-800-424-8802	

This brief summary is meant to be used for general information only, may not include all regulatory reporting requirements, and does not contain the detail in the actual text.
Revised July 2000

Hazardous Waste/Material/Substance Continued

Regulation	When Required	Information Required	Notify Whom	Oral Notice Time	Phone Numbers	Written Notice Time
49 CFR 171.15 49 CFR 195.52	Hazardous materials release (as defined by DOT in 29 CFR 171.8) causes death, serious injury, major property damage, evacuation, closure of a major highway, aircraft flight path altered, pollution of a water body, release of infectious substance, or continuing danger to life	Reporter name and phone number, name and address of carrier, incident date, time and location, extent of injuries, classification, name and quantity of hazardous materials involved, type of incident and nature of hazardous materials involvement, whether a continuing danger to life exists.	NRC	earliest practicable moment	1-800-4248802	30 days (see 49 CFR 171.16 for details)
EPCRA 304 40 CFR 355.40	Release of "Extremely Hazardous Substance" or CERCLA substance, over the RQ, exposing persons outside the facility boundaries	Chemical name, quantity, release time and duration, health risks, medical advice, precautions, contact names and phone numbers	LEPC SERC	Immediately	Various 536-4123 (24 hours)	As soon as practicable
R315-8-4.7(a) R315-7-11.7(a)	Any imminent or actual emergency at a hazardous waste Treatment, Storage or Disposal (TSD) permitted facility	Facility name, address, EPA ID number. Incident date, time and type. Quantity of waste Injuries	DEQ, federal OSC, State and local response agencies	Immediately		15 days
40 CFR 264.56/ 265.56 40 CFR 279.52	Imminent or actual emergency situation at a TSD or used oil processor or used oil refiner facility	Facility name, address, EPA ID number Incident date, time and type Quantity of waste. Injuries. Possible hazards to human health or the environment outside the facility.	State and local response agencies, NRC	Immediately	1-800-424-8802	15 days
40 CFR 262.34 40 CFR 264.56	When a fire, explosion or other release at a hazardous waste generator or TSD facility could threaten human health outside the facility, or when the spill has reached surface water	Facility name, address, EPA ID number Incident date, time and type. Quantity of waste Injuries. Quantity of recovered materials. Possible hazards to human health or the environment outside the facility	NRC	Immediately	1-800-424-8802	15 days
R315-8-4.7(d) R315-7-11.7(d)	When a fire, explosion or other release at a hazardous waste TSD facility could threaten human health or the environment outside the facility	Name and phone number of reporter. Facility name, address. Incident date, time and type. Name and quantity of waste. Injuries. Human health or environmental hazards	DEQ Federal OSC NRC	Immediately	538-4170 1-303-293-1788 1-800-424-8802	5 days
R315-3-10(i)(6) 40 CFR 270.30	Any TSD permittee noncompliance which may endanger health or the environment	Releases of hazardous waste that may cause endangerment to public drinking water systems Information on releases of hazardous waste or fire or explosions which could threaten the environment or human health outside the facility Name and phone number of reporter. Facility name, address Incident date, time and type. Name and quantity of waste. Injuries Description of occurrence. Human health or environmental hazards Estimated quantity and disposition of recovered material.	Div of Solid & Hazardous Waste	24 hours	536-6170	5 days

This brief summary is meant to be used for general information only, may not include all regulatory reporting requirements, and does not contain the detail in the actual text.
Revised July 2000

Hazardous Waste/Material/Substance Continued						
Regulation	When Required	Information Required	Notify Whom	Oral Notice Time	Phone Numbers	Written Notice Time
40 CFR 264 196(d) 265 196(d) R315-8-10 R315-7-12	When a hazardous waste disposal facility discovers a tank or secondary containment system leak	Not specified	EPA administrator Div of Solid & Hazardous Waste	24 hours	1-303-293-1788 538-6170	
40 CFR 761 125	When PCB contaminated material contaminates surface water, sewers, drinking water, grazing lands or vegetable gardens.	Not specified	EPA Region	24 hours	1-303-293-1788	
40 CFR 302 6	Release of PCB's into the environment in amounts greater than 1 pound	Not specified	NRC	Immediately	1-800-424-8802	
R315-303-5(7)(c)	When a landfill operator discovers receipt of a hazardous waste or PCB contaminated waste	Not specified	Div of Solid & Hazardous Waste, Hauler, Generator	24 hours	538-6170 536-4123 (off hours)	
R315-303-4-(5)	When methane levels at a landfill exceed state limits in R315-303(2)(a)	Not specified	Div. of Solid & Hazardous Waste	Immediately	538-6170 536-4123 (off hours)	
40 CFR 258 23	When methane levels at a landfill exceed specified federal limits.	Not specified	State Director	Immediately	538-6170 536-4123 (off hours)	
Radioactive Materials						
R313-38-77(2)(b)	If a sealed radiation source or device containing radioactive material is damaged, or if contamination is detected at the surface after the source is used in a subsurface tracer study	Circumstances of the loss and request approval of abandonment procedures	Div of Rad. Control	Immediately	536-4250 536-4123 (off hours)	
R313-38-77(5)(b)	If radioactive material has been lost in or to an underground potable water source	Well location Magnitude and extent of radioactive material loss. Consequences of such loss. Efforts being taken to mitigate these consequences	Div of Rad. Control	Immediately	536-4250 536-4123 (off hours)	
R313-32-33(1)	Misadministration of a radioactive material in a therapy procedure	Not specified	Div of Rad Control	24 hours	536-4250 536-4123 (off hours)	
R313-15-1202(1)	Event involving a radioactive material which caused or threatens to cause a specified exposure or specified amount of property damage	Not specified	Div. of Rad. Control	Immediately	536-4250 536-4123 (off hours)	

Regulation	When Required	Information Required	Notify Whom	Oral Notice Time	Phone Numbers	Written Notice Time
Radioactive Materials Continued						
R313-15-1202(2)	Loss of licensed or registered source of radiation that may have caused or threatens to cause a specified exposure or specified amount of property damage.	Not specified	Div. of Rad. Control	24 hours	536-4250 536-4123 (off hours)	
Releases From Underground Storage Tanks						
Utah Code 19-6-420 (3)	Releases from an underground storage tank presenting the possibility of an imminent and substantial danger to public health or the environment	Abatement action taken	Div. of Env. Response & Remediation	24 hours	**536-4123 (24 hours)**	
R311-201-7	Discovery of a release from an underground storage tank	Not specified	Div of Env Response & Remediation	24 hours	**536-4123 (24 hours)**	
40 CFR 280.50	Release of a regulated substance, unusual operation conditions or monitoring results that indicate a release	Not specified	State	24 hours	**536-4123 (24 hours)**	
40 CFR 280.53	A spill or overfill that is: 1. > 25 gallons; or 2. causes a sheen on surface water, or 3. > reportable quantity of a CERCLA hazardous substance into the environment; or 4. In violation of Clean Water Act 311(b)(3)	Not specified	Div. of Env. Response and Remediation (see also ref 8,31,32)	24 hours	**536-4123 (24 hours)**	
Used Oil						
R315-15-9	Used oil spills > 25 gallons or potential threat to human health or environment.	Name, phone number and address of person responsible for spill. Name, title and phone number of individual reporting. Time and date of spill. Spill location - including nearest city, highway, or waterway Amount and description of material spilled. Cause of the spill. Action taken to minimize threats to human health and the environment.	DEQ	Immediately	536-4123	15 Days

Water Quality						
Regulation	**When Required**	**Information Required**	**Notify Whom**	**Oral Notice Time**	**Phone Numbers**	**Written Notice Time**
Utah Code 19-5-114	Spill of substance which could pollute the waters of the state	Material, actions taken, cleanup and disposal plan	Div. of Water Quality	Immediately	538-6146 536-4123 (off hours)	
40 CFR 110	If oil or hazardous substance release: (1)causes a sheen; or (2)violates water quality standards, or (3) causes sludge or emulsion to be deposited below water level	Not specified	NRC	Immediately	1-800-424-8802	
R317-8-4 (b)(12)(f)	Any UPDES permittee noncompliance which may endanger health or the environment including, but not limited to: (1) unanticipated bypasses which exceed effluent permit limitations, (2) any upset which exceeds effluent limitation; (3) violation of maximum daily discharge limitation for permit listed pollutants.	Name and telephone number of reporting party. Time and type of incident. Name and quantity of materials released Injuries. Health hazards	Div. of Water Quality	24 hours	538-6146 536-4123 (off hours)	5 days
R318-8.10 (7)(b) R318-8.13 (c) and 8.14 (3)(b)	1. Sampling indicates a violation of water pollution control pretreatment standards. 2. A pretreatment system "upset" that exceeds pretreatment standards. 3. An unanticipated pretreatment bypass.	Not specified	"Control Authority", which is DEQ or the POTW, depending on the permit	24 hours		
40 CFR 403.12 40 CFR 403.16/17	1. Sampling indicates a violation of water pollution control pretreatment standards. 2. A pretreatment system "upset" that exceeds pretreatment standards. 3. An unanticipated pretreatment bypass.	Not specified	"Control Authority", which is DEQ or the POTW, depending on the permit	24 hours		
R317-6-6.13	Mechanical or discharge system failures affecting the chemical characteristics or volume of a ground water discharge	Not specified	Div. of Water Quality	Immediately	538-6146 536-4123 (off hours)	30 days
R317-6-6.11	Commencement of groundwater discharge	Not specified	Div of Water Quality	Immediately	538-6146 536-4123 (off hours)	
R317-6-6.11	Discontinuance of groundwater discharge due to spill, leak or accidental release	Not specified	Div. of Water Quality	Immediately	538-6146 536-4123 (off hours)	5 days
R317-6-6.18	Out of compliance with ground water discharge permit	Not specified	Div. of Water Quality	Immediately	538-6146 536-4123 (off hours)	5 days

EXHIBIT I

FINANCIAL ASSURANCE CALCULATIONS

Client: Weber County / Moulding & Sons Landfill, LLC
Project: Weber County C&D Landfill
Feature: C&D Closure Construction Cost Calculations
Date: 01/15/09

C&D Landfill Closure Construction

						Constructed To Date		Remaining Construction Quantity		
Description	Unit	Total Calculated Quantity	Total Estimated Payment Quantity	Estimated Unit Cost	Total Estimated Construction Cost	Estimated Quantity	Payment Quantity	Calculated Quantity	Payment Quantity	Remaining Construction Cost
Earth Work										
Closure Soil	cy	343,156	360,313	$4.28	$1,542,141.24	0	$0.00	360,313	360,313	$1,542,141.24
Vegetation	ac	106	112	$1,038.89	$116,010.11	0	$0.00	112	112	$116,010.11
Stone Mulch	cy	0	0	$30.00	$0.00	0	$0.00	0	0	$0.00
Pipe Installations										
18" Dia. Single CPE Pipe (Storm Drain)	lf	80	80	$39.68	$3,174.40	0	$0.00	80	80	$3,174.40
21" Dia. Single CPE Pipe (Storm Drain)	lf	500	500	$39.68	$19,840.00	0	$0.00	500	500	$19,840.00
24" Dia. Single CPE Pipe (Storm Drain)	lf	0	0	$39.68	$0.00	0	$0.00	0	0	$0.00
4'x4' Concrete Inlet Boxes	ea	4	4	$2,584.82	$10,339.28	0	$0.00	4	4	$10,339.28
Operational Facilities										
Mobile Office	lsum	1	1	$579.55	$579.55	0	$0.00	1	1	$579.55
Shop (Assume 40' x 60')	lsum	1	1	$30,811.77	$30,811.77	0	$0.00	1	1	$30,811.77
Hard Surface Roads	sy	3,307	3,307	$7.25	$23,974.94	0	$0.00	3,307	3,307	$23,974.94
Concrete pads (trailer and electric)	sy	1,104	1,104	$5.39	$5,950.56	0	$0.00	1,104	1,104	$5,950.56
Engineering Design and CQC/CQA During Construction										
Design (2% of Construction Costs)			100%	$35,056.44	$35,056.44	0%	$0.00	100%	100%	$35,056.44
Construction Surveying (1% of Construction Costs)			100%	$17,528.22	$17,528.22	0%	$0.00	100%	100%	$17,528.22
CQC/CQA During Construction (1% of Construction Costs)			100%	$17,528.22	$17,528.22	0%	$0.00	100%	100%	$17,528.22
Total of Closure Construction Costs					$1,822,934.73		$0.00			$1,822,934.73
Cost Per Acre	**100.5**	**acres =**	**$18,130.16**	**per acre**						
Cost Per CY of Waste	**16,000,000**	**CY =**	**$0.11**	**per cubic yard**						

Client: Weber County / Moulding & Sons Landfill, LLC
Project: Weber County C&D Landfill
Feature: Facility Post Closure Cost Calculations
Date: 01/15/09

30 Year Maintenance

Description	Unit	Total Calculated Quantity	Estimated Unit Cost	Total Estimated Construction Cost	Completed To Date: Estimated Quantity	Completed To Date: Payment Amount	Remaining To Date: Calculated Quantity	Remaining To Date: Remaining Construction Cost
Inspections								
Inspection and Reporting	Annual LS	30	$2,400.00	$72,000.00	0	$0.00	30	$72,000.00
Maintenance								
Security – Fences, Gates, Signs, Access, Etc.	Annual LS	30	$3,284.04	$98,521.20	0	$0.00	30	$98,521.20
Erosion/Settlement Repairs, Erosion Control Repair	Annual LS	30	$5,668.02	$170,040.60	0	$0.00	30	$170,040.60
Surface Water Facilities (run-on/run-off) Maintenance	Annual LS	30	$1,200.88	$36,026.40	0	$0.00	30	$36,026.40
Storm Drainage Pipe Maintenance	Annual LS	30	$1,110.44	$33,313.20	0	$0.00	30	$33,313.20
Total of Closure Construction Costs				$409,901.40		$0.00		$409,901.40
Cost Per Acre	**100.5**	**acres =**	**$4,076.71**	**per acre**				
Cost Per CY of Waste	**16,000,000**	**CY =**	**$0.03**	**per cubic yard**				

Facility: Weber County C&D Landfill
Feature: *Unit Cost Estimates for Closure and Post Closure Care*
Date: 1/15/2009

Note No.	Description	Estimated Unit Cost	Unit	Explanation
		CLOSURE COSTS		
	Supply & Placement of Closure Cap			
1	General Contractor Mobilization/Demobilization	$ 30,000.00	lump sum	Lump sum price is assumed based on mobilization of similar equipment to this project, some scrapers, dozer and motor grader. Assume using a local contractor to the Ogden providing a short mobilization distance.
2	Final Cover (24")	$ 4.28	cy	2008 RS Means (page 225) shows a cost of $1.85/cy to place and spread fill material with no compaction and 2.63/cy for borrowing and 1/2 mile round trip hauling using 22 cy off road haulers. The total is (1.85 + 2.63) x 0.928 = $4.16/cy x 1.028 = $4.28
3	Grading of Waste/Surface Preparation	$ 1,123.16	Acre	Assume 1/3 day of grading per acre using a motor grader and a dozer. 2008 RS Means (pages 449 and 450) provides daily costs of $1,102 for a 55,000 lb grader and $2,430 for a 500 H.P. dozer which includes the crew cost Total daily cost is, therefore, $3,532 and factored by the local multiplier of 0.928 gives a daily cost of $3,277.70 or $1,092.57 per acre x 1.028 = $1,123.16
4	Surveying for Grade Control	$ 300.00	acre	Assume 2 hours of surveying per acre at a rate of $155 per hour for GPS surveying (typical local GPS survey rate) for a cost of $310.00/acre.
5	Seeding	$ 1,038.89	Acre	Assumed for tractor seeding using a drill. The cost is obtained using 6 lb per 1000 square feet or 260 lbs per acre for a rye seed mix which will be similar to other range grasses. 2008 RS Means (page 283) shows the cost to be $25/1000 square feet or $1,089/acre which includes overhead and profit. After multiplying by the local factor of 0 928 gives $1,010.59/acre x 1.028 = $1,038.89
	Stormwater/Groundwater Controls			
6	Downdrain Pipe	$ 39.68	LF	RS Means, page 312, provides a materials and labor cost of $26/lf for installation of 24" diameter HDPE Type S storm drainage pipe. Trench excavation is $2.97/cy (RS Means Page 210, 1.5 cy bucket) and with a 3' x 3' trench, it would be $2.97 x 0.33 cy/lf = $0 98/lf. Backfill is $27.00/cy with no compaction requirements, the cost is (27.00 x 0.33 = 8.91) $8.91/lf Assume the trench is compacted by hand for $17.25/cy for a cost of (17.25 x 0.33 = 5.70) $5.70/lf (RS Means 222). The total per foot cost is therefore $26.00 (pipe) + $0.98 (excavation) + $8.91 (backfill) + $5.70 (compaction) = $41.59/lf (Total). Applying a local factor of 0.928 gives an adjusted total of $38.60 x 1.028 = $39.68
7	Inlet Boxes	$ 2,584.82	EA	RS Means, page 318, provides a cast-in-place drainage inlet box 4' x 4' x 4' deep at $1,975, grating is $24.00/sf (page 114, RS Means) with about 24 sq ft., and backfill is $79.25/cy (page 222) for hand placement and compaction in 6" lifts. Assume 2 cy of backfill gives a total cost of $1,975 (concrete box) + $576 (grating) + $158.50 (backfill) = $2,709.50 (Total). Applying a local factor of 0.928 gives an adjusted total of $2,514.42 x 1.028 = $2,584.82
8	Pond Excavation/Earthwork	$ 1.33	CY	2009 ENR Costbook, page 53. Cost is $1.42/cy large area excavations using a 2-1/2 cy bucket front end loader. Assume that deposition of excavated materials to be around the perimeter of the pond areas for very little haul distance from side to side. Applying a factor of 0.93 for local costs gives a cost of $1.33/cy.
	Operations Facilities			
9	Mobile Office	$ 579.55	LS	Assume the mobile office is sufficiently aged that there is no salvage value or sales value Move the office to the landfill area for disposal. Assume 2 hours dozer (¼ day) to pull to landfill and to crush. 2008 RS Means (pages 449 and 450) provides daily costs of $2,430 for a 500 H.P. dozer which includes the crew cost. 0.25 x 2430 x 0.928 = $563.76 x 1.028 = $579.55
10	Shop (demolish and dispose, recycle steel, etc.)	$ 30,811.77	LS	Is not expected to be constructed the first year of operation. However, the shop will be 2400 square feet or less of steel building with a restroom, office, and concrete floor. 2008 RS Means (page 33 and 34) shows a demolition cost per cubic foot of building volume standing. A small steel building with no salvage value provides a cost of $0.30/cf. Assuming a building that averages 25 feet in height provides a volume of 60,000 cf. Demolition cost is 0.30 x 60000 x 0.928 = $16,704. Concrete slab is $5 65/sf for a cost of 5.65 x 2400 x 0.928 = $12,583.68. Footings of 18" thick and 6' x 6' wide are about $41.00/lf (double a 3' wide footing). Assume the footings to only exist at column supports for the building every 20 feet around the perimeter. This results in 6 columns for a total length of 18 lf. Assume on-site disposal in the landfill for a total cost of 18 x 41 x .928 = $684 86. The total cost of the demolition is about $29,972.54 x 1.028 = $30,811.77. Demolition materials to be disposed in the landfill
11	Concrete Pad Demolition (remove and dispose)	$ 5.39	SF	Concrete pads include the mobile office pad, possible transformer pad, steps to the east door of the mobile office and the steps and ADA ramp to the west door of the mobile office. 2008 RS Means (page 34) provides a cost of $5 65/sf x .928 = $5.24/sf x 1.028 = $5.39 (demolition materials to be disposed in the landfill)
12	Bituminous Pavements (remove and dispose)	$ 7.25	SY	RS Means (page 23) provides a cost of $7.60/sy for a 4" to 6" pavement when adjusted to local costs gives 7.60 x 0.928 = $7.05/sy x 1.028 = $7.25 The pavement the first year will only extend to about 50 feet south of the entrance gate but may eventually include the entire entrance drive to the access control gates, the parking area west of the mobile office and the access road to the parking area. Demolition materials to be disposed in the landfill.
	Other: (List)			
13	Engineering Site Evaluation	2	%	Assume 2% of the construction costs
14	*Design, Specification & CQA/CQC Manual*	1	%	*Assume 1% of the construction costs*
15	Project Mgmt. & QA/QC, Oversight, Testing, & Reportin	1	%	Assume 1% of the construction costs
		POST CLOSURE/POST CLOSURE CARE COSTS		
	Maintenance Costs			
16	Security, fencing, gates, signs, access, etc.	$ 3,482.04	Yr	Barbed wire fencing is estimated at about $36.50/lf (2008 RS Means, page 273) Assume repairs average about 100 lf per year. Therefore, the cost is about $3,650 per year. Adjusting for the regional multiplier of 0.928 gives a cost of $3,387.20 x 1.028 = $3,482.04/year. Welded wire fabric fence with 2" x 4" spaces and 12.5 gage is $20.50/lf. Use the barbed wire cost.
17	Erosion repair, settlement repair, revegetation, stone mulch replacement.	$ 5,668 02	Yr	Assume erosion and settlement repairs require 2 days effort using a dozer, dump truck and a wheel loader. The combined cost is $1,388 (dozer) + $502 80 (dump truck) + $536 (loader) = $2,426.80/day (RS Means, pages 449, 451 & 451). Assume seeding to be 1 acres per year where repairs may occur at a price of $1,009.50/ac from above. Total cost is ($2,426.80 x 2 x 0.928) + ($1009.50 x 1) = $5,513.64 x 1.028 = $5,668.02.
18	Surface water control maintenance (run-on/run-off)	$ 1,200 88	Yr	Assume repairs and maintenance may require 3 days effort using a backhoe, dump truck and a wheel loader assumed every 5 years. The combined cost is $1,060 (excavator) + $502.80 (dump truck) + $536 (loader) = $2,098.80/day (RS Means, pages 449, 451 & 451). These costs will include the cost for general repair and cleaning sediments, if ever needed. Total cost is (($2,098.80 x 3 days x 0 928)/5 yrs = $1,168.17 x 1.028 = $1,200.88/yr average.
19	Storm Drainage Pipe Maintenance	$ 1,110 44	Yr	Pipe cleaning costs are between $3.10/lf and $8.06/lf, use $6.00/lf (RS Means, page 292. Cleaning will probably only be needed every 5 years and will include roughly 970 lf storm drains and down drains. The cost is, therefore, (970 x $6 x 0.928)/5 = $1,080.19 x 1.028 = $1,110.44/year.
	Monitoring Costs			
20	Part time Employee monitoring for Storm Water and Site Monitoring.	$ 2,400.00	Yr	Assume 8 hours per quarter to walk the fence lines, storm drainage facilities, and the closure cap surface. Assume a going rate (cost plus overhead and benefits) of about $75.00/hr. 8 x4 x 75 = $2,400/year

Notes:

RS Means - RS Means Heavy Construction Cost Data, 22nd Edition, 2008
ENR Costbook - ENR Square Foot Costbook, 2009 Edition
DSHW Year over Year Allowable Inflation Rate Adjustment is 2.8%.
RS Means Regional Price Adjustment Factor for the Ogden area = 0.928, RS Means, Page 506.
ENR Costbook Retional Price Adjustment Factor = 0.93, ENR Costbook, Page 181.

Client: Weber County / Moulding & Sons Landfill, LLC
Project: Weber County C&D Landfill
Feature: C&D Closure Construction Quantity Calculations
Date: 01/15/09

2.5H:1V Plan to Slope Area Conversion =		1.078		
10% Plan to Slope Area Conversion =		1.005		
6H:1V Plan to Slope Area Conversion =		1.014		
Closure Soil Thickness =	2	ft		
Stone Mulch Thickness =	3	inches =	0.25	ft
Top Soil Thickness =	6	inches =	0.5	ft

C&D Closure Construction

Areas:

Description	North Slope Plan Area (sf)	North Slope Slope Area (sf)
Top 10% Slope Area	771,531	775,388
Upper 2.5:1 Slope	553,728	596,919
Upper Bench	96,229	97,576
Upper Middle 2.5:1 Slope	733,774	791,009
Upper Middle Bench	118,118	119,771
Lower Middle 2.5:1 Slope	873,382	941,506
Lower Middle Bench	135,562	137,460
Lower 2.5:1 Slope	967,477	1,042,940
Lower Perimeter Road	130,031	130,031
Total Closure Area	4,379,832	4,632,601
Closure Soil Quantity, cy		343,156

RSMeans

Heavy Construction Cost Data

22nd Annual Edition

2008

02 21 Surveys

02 21 13 – Site Surveys

02 21 13.09 Topographical Surveys

	02 21 13.09 Topographical Surveys	Crew	Daily Output	Labor-Hours	Unit	2008 Bare Costs Material	Labor	Equipment	Total	Total Incl O&P
0010	TOPOGRAPHICAL SURVEYS									
0020	Topographical surveying, conventional, minimum	A-7	3.30	7.273	Acre	17	305	21	343	505
0100	Maximum	A-8	.60	53.333	″	52	2,175	115	2,342	3,500

02 21 13.13 Boundary and Survey Markers

		Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	BOUNDARY AND SURVEY MARKERS									
0300	Lot location and lines, large quantities, minimum	A-7	2	12	Acre	30	500	34.50	564.50	840
0320	Average	″	1.25	19.200		48	800	55	903	1,350
0400	Small quantities, maximum	A-8	1	32		64	1,300	69	1,433	2,150
0600	Monuments, 3′ long	A-7	10	2.400	Ea.	30	100	6.90	136.90	195
0800	Property lines, perimeter, cleared land	″	1000	.024	L.F.	.03	1	.07	1.10	1.65

02 21 13.16 Aerial Surveys

		Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	AERIAL SURVEYS									
1500	Aerial surveying, including ground control, minimum fee, 10 acres				Total					5,700
1510	100 acres									9,500
1550	From existing photography, deduct									1,370
1600	2′ contours, 10 acres				Acre					460
1650	20 acres									315
1800	50 acres									95
1850	100 acres									85
2150	For 1′ contours and									
2160	dense urban areas, add to above				Acre					40%
3000	Inertial guidance system for									
3010	locating coordinates, rent per day				Ea.					4,000

02 32 Geotechnical Investigations

02 32 13 – Subsurface Drilling and Sampling

02 32 13.10 Boring and Exploratory Drilling

		Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	BORING AND EXPLORATORY DRILLING									
0020	Borings, initial field stake out & determination of elevations	A-6	1	16	Day		615	69	684	1,025
0100	Drawings showing boring details				Total		233.10		233.10	340.20
0200	Report and recommendations from P.E.						525		525	766.50
0300	Mobilization and demobilization, minimum	B-55	4	6			180	231	411	535
0350	For over 100 miles, per added mile		450	.053	Mile		1.60	2.06	3.66	4.74
0600	Auger holes in earth, no samples, 2-1/2″ diameter		78.60	.305	L.F.		9.15	11.80	20.95	27
0650	4″ diameter		67.50	.356			10.65	13.70	24.35	31.50
0800	Cased borings in earth, with samples, 2-1/2″ diameter		55.50	.432		17.40	12.95	16.70	47.05	57.50
0850	4″ diameter		32.60	.736		27.50	22	28.50	78	95.50
1000	Drilling in rock, "BX" core, no sampling	B-56	34.90	.458			15.60	37	52.60	64.50
1050	With casing & sampling		31.70	.505		17.40	17.15	41	75.55	90.50
1200	"NX" core, no sampling		25.92	.617			21	50	71	87
1250	With casing and sampling		25	.640		21	22	51.50	94.50	114
1400	Borings, earth, drill rig and crew with truck mounted auger	B-55	1	24	Day		720	925	1,645	2,150
1450	Rock using crawler type drill	B-56	1	16	″		545	1,300	1,845	2,250
1500	For inner city borings add, minimum									10%
1510	Maximum									20%

02 32 19 – Exploratory Excavations

02 32 19.10 Test Pits

		Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	TEST PITS									
0020	Hand digging, light soil	1 Clab	4.50	1.778	C.Y.		54		54	83.50
0100	Heavy soil		2.50	3.200			97		97	151

02 32 Geotechnical Investigations

02 32 19 – Exploratory Excavations

02 32 19.10 Test Pits		Crew	Daily Output	Labor-Hours	Unit	Material	2008 Bare Costs Labor	Equipment	Total	Total Incl O&P
[illegible]	Loader-backhoe, light soil	B-11M	28	.571	C.Y.		20	12.15	32.15	44
0[illegible]	Heavy soil	"	20	.800	↓		28	17.05	45.05	62
1000	Subsurface exploration, mobilization				Mile				7.50	8.63
1010	Difficult access for rig, add				Hr.				150	172.20
1020	Auger borings, drill rig, incl. samples				L.F.				17.27	19.87
1030	Hand auger								25.52	29.36
1050	Drill and sample every 5', split spoon				↓				22.52	25.90
1060	Extra samples				Ea.				30.45	35.02

02 41 Demolition

02 41 13 – Selective Site Demolition

02 41 13.15 Hydrodemolition

		Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	**HYDRODEMOLITION** R024119-10									
0015	Hydrodemolition, concrete pavement, 4000 PSI, 2" depth	B-5	500	.112	S.F.		3.73	2.17	5.90	8.15
0120	4" depth		450	.124			4.14	2.41	6.55	9.05
0130	6" depth		400	.140			4.66	2.71	7.37	10.15
0410	6000 PSI, 2" depth		410	.137			4.55	2.65	7.20	9.90
0420	4" depth		350	.160			5.30	3.10	8.40	11.60
0430	6" depth		300	.187			6.20	3.62	9.82	13.55
0510	8000 PSI, 2" depth		330	.170			5.65	3.29	8.94	12.30
0520	4" depth		280	.200			6.65	3.88	10.53	14.50
[illegible]	6" depth	↓	240	.233	↓		7.75	4.52	12.27	16.90

02 41 13.17 Demolish, Remove Pavement and Curb

		Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
00[illegible]	**DEMOLISH, REMOVE PAVEMENT AND CURB** R024119-10									
5010	Pavement removal, bituminous roads, 3" thick	B-38	690	.058	S.Y.		1.98	1.45	3.43	4.63
5050	4" to 6" thick		420	.095			3.24	2.39	5.63	7.60
5100	Bituminous driveways		640	.063			2.13	1.57	3.70	4.99
5200	Concrete to 6" thick, hydraulic hammer, mesh reinforced		255	.157			5.35	3.93	9.28	12.50
5300	Rod reinforced		200	.200	↓		6.80	5	11.80	15.95
5400	Concrete, 7" to 24" thick, plain		33	1.212	C.Y.		41.50	30.50	72	97
5500	Reinforced	↓	24	1.667	"		57	42	99	133
5600	With hand held air equipment, bituminous, to 6" thick	B-39	1900	.025	S.F.		.80	.10	.90	1.35
5700	Concrete to 6" thick, no reinforcing		1600	.030			.95	.12	1.07	1.61
5800	Mesh reinforced		1400	.034			1.09	.14	1.23	1.84
5900	Rod reinforced	↓	765	.063	↓		2	.25	2.25	3.37
6000	Curbs, concrete, plain	B-6	360	.067	L.F.		2.18	.79	2.97	4.23
6100	Reinforced		275	.087			2.86	1.04	3.90	5.55
6200	Granite		360	.067			2.18	.79	2.97	4.23
6300	Bituminous		528	.045			1.49	.54	2.03	2.88
6500	Site demo, berms under 4" in height, bituminous		528	.045			1.49	.54	2.03	2.88
6600	4" or over in height	↓	300	.080	↓		2.62	.95	3.57	5.10

02 41 13.20 Selective Demo, Highway Guard Rails & Barriers

		Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	**SELECTIVE DEMOLITION, HIGHWAY GUARD RAILS & BARRIERS**									
0100	Guard rail, corrugated steel	B-6	600	.040	L.F.		1.31	.48	1.79	2.53
0200	End sections		40	.600	Ea.		19.65	7.15	26.80	38
[illegible]	Wrap around		40	.600	"		19.65	7.15	26.80	38
04[illegible]	Timber 4" x 8"		600	.040	L.F.		1.31	.48	1.79	2.53
050[illegible]	Three 3/4" cables		600	.040	"		1.31	.48	1.79	2.53
0600	Wood posts	↓	240	.100	Ea.		3.28	1.19	4.47	6.35
0700	Guide rail, 6" x 6" box beam	B-80B	120	.267	L.F.		8.55	1.87	10.42	15.25

05 53 19 – Aluminum Floor Grating

05 53 19.50 Floor Grating, Aluminum		Crew	Daily Output	Labor-Hours	Unit	2008 Bare Costs Material	Labor	Equipment	Total	Total Incl O&P
1900	2-1/4" deep, 5.0# per S.F.	E-4	875	.037	S.F.	19.20	1.59	.15	20.94	24
2100	For safety serrated surface, add					15%				

05 53 21 – Steel Floor Grating

05 53 21.50 Floor Grating, Steel		Crew	Daily Output	Labor-Hours	Unit	2008 Bare Costs Material	Labor	Equipment	Total	Total Incl O&P
0010	**FLOOR GRATING, STEEL**, field fabricated from panels									
0050	Labor for installing, from ground/floor	E-4	845	.038	S.F.		1.65	.16	1.81	3.14
0100	Elevated		460	.070	"		3.03	.29	3.32	5.75
0300	Platforms, to 12' high, rectangular		3150	.010	Lb.	1.54	.44	.04	2.02	2.54
0400	Circular		2300	.014	"	1.69	.61	.06	2.36	3.01
0410	Painted bearing bars @ 1-3/16"									
0412	Cross bars @ 4" O.C., 3/4" x 1/8" bar, up to 300 S.F.	E-2	500	.112	S.F.	6.45	4.69	3.13	14.27	18.65
0414	Over 300 S.F.		750	.075		5.85	3.13	2.09	11.07	14.15
0422	1-1/4" x 3/16", up to 300 S.F.		400	.140		8.70	5.85	3.92	18.47	24
0424	Over 300 S.F.		600	.093		7.90	3.91	2.61	14.42	18.30
0432	1-1/2" x 1/8", up to 300 S.F.		400	.140		7.80	5.85	3.92	17.57	23
0434	Over 300 S.F.		600	.093		7.10	3.91	2.61	13.62	17.40
0436	1-3/4" x 3/16", up to 300 S.F.		400	.140		11.35	5.85	3.92	21.12	27
0438	Over 300 S.F.		600	.093		10.30	3.91	2.61	16.82	21
0452	2-1/4" x 3/16", up to 300 S.F.		300	.187		13.45	7.80	5.20	26.45	34
0454	Over 300 S.F.		450	.124		12.20	5.20	3.48	20.88	26.50
0462	Cross bars @ 2" O.C., 3/4" x 1/8", up to 300 S.F.		500	.112		12.45	4.69	3.13	20.27	25.50
0464	Over 300 S.F.		750	.075		10.35	3.13	2.09	15.57	19.10
0472	1-1/4" x 3/16", up to 300 S.F.		400	.140		18.65	5.85	3.92	28.42	35
0474	Over 300 S.F.		600	.093		15.55	3.91	2.61	22.07	26.50
0482	1-1/2" x 1/8", up to 300 S.F.		400	.140		14.40	5.85	3.92	24.17	30.50
0484	Over 300 S.F.		600	.093		12	3.91	2.61	18.52	23
0486	1-3/4" x 3/16", up to 300 S.F.		400	.140		19.45	5.85	3.92	29.22	36
0488	Over 300 S.F.		600	.093		16.20	3.91	2.61	22.72	27.50
0502	2-1/4" x 3/16", up to 300 S.F.		300	.187		23	7.80	5.20	36	45
0504	Over 300 S.F.		450	.124		19.30	5.20	3.48	27.98	34.50
0601	Painted bearing bars @ 15/16" O.C., cross bars @ 4" O.C.,									
0612	Up to 300 S.F., 3/4" x 1/8" bars	E-4	850	.038	S.F.	8.05	1.64	.16	9.85	11.95
0622	1-1/4" x 3/16" bars		600	.053		11.35	2.32	.22	13.89	16.90
0632	1-1/2" x 1/8" bars		550	.058		10.35	2.53	.24	13.12	16.20
0636	1-3/4" x 3/16" bars		450	.071		14.95	3.09	.29	18.33	22.50
0657	2-1/4" x 3/16" bars	E-2	300	.187		19.55	7.80	5.20	32.55	41
0662	Cross bars @ 2" O.C., up to 300 S.F., 3/4" x 1/8"		500	.112		13.70	4.69	3.13	21.52	26.50
0672	1-1/4" x 3/16" bars		400	.140		14.75	5.85	3.92	24.52	30.50
0682	1-1/2" x 1/8" bars		400	.140		14.05	5.85	3.92	23.82	30
0686	1-3/4" x 3/16" bars		300	.187		19.10	7.80	5.20	32.10	40.50
0690	For galvanized grating, add					25%				
0800	For straight cuts, add				L.F.	2.82			2.82	3.10
0900	For curved cuts, add					3.88			3.88	4.27
1000	For straight banding, add					3.29			3.29	3.62
1100	For curved banding, add					5.10			5.10	5.60
1200	For checkered plate nosings, add					5.80			5.80	6.40
1300	For straight toe or kick plate, add					8.20			8.20	9
1400	For curved toe or kick plate, add					9.95			9.95	10.95
1500	For abrasive nosings, add					6			6	6.60
1600	For safety serrated surface, minimum, add					15%				
1700	Maximum, add					25%				
2000	Stainless steel gratings, close spaced, 1" x 1/8" bars, up to 300 S.F.	E-4	450	.071	S.F.	38.50	3.09	.29	41.88	48

31 23 16.13 Excavating, Trench		Crew	Daily Output	Labor-Hours	Unit	Material	2008 Bare Costs Labor	Equipment	Total	Total Incl O&P
0500	6' to 10' deep, 3/4 C.Y. excavator	B-12F	225	.071	B.C.Y.		2.53	2.44	4.97	6.55
0510	1 C.Y. excavator	B-12A	400	.040			1.42	1.62	3.04	3.96
0600	1 C.Y. excavator, truck mounted	B-12K	400	.040			1.42	2.72	4.14	5.15
0610	1-1/2 C.Y. excavator	B-12B	600	.027			.95	1.38	2.33	2.97
0620	2-1/2 C.Y. excavator	B-12S	1000	.016			.57	1.47	2.04	2.48
0900	10' to 14' deep, 3/4 C.Y. excavator	B-12E	200	.080			2.85	2.75	5.60	7.35
0910	1 C.Y. excavator	B-12A	360	.044			1.58	1.80	3.38	4.30
1000	1-1/2 C.Y. excavator	B-12B	540	.030			1.05	1.54	2.59	3.30
1020	2-1/2 C.Y. excavator	B-12S	1000	.016			.57	1.47	2.04	2.48
1030	3 C.Y. excavator	B-12D	1400	.011			.41	1.67	2.08	2.46
1040	3-1/2 C.Y. excavator	"	1800	.009			.32	1.30	1.62	1.91
1300	14' to 20' deep, 1 C.Y. excavator	B-12A	320	.050			1.78	2.02	3.80	4.94
1310	1-1/2 C.Y. excavator	B-12B	480	.033			1.19	1.73	2.92	3.74
1320	2-1/2 C.Y. excavator	B-12S	850	.019			.67	1.72	2.39	2.92
1330	3 C.Y. excavator	B-12D	1000	.016			.57	2.34	2.91	3.41
1335	3-1/2 C.Y. excavator	"	1150	.014			.50	2.03	2.53	2.99
1340	20' to 24' deep, 1 C.Y. excavator	B-12A	288	.056			1.98	2.25	4.23	5.50
1342	1-1/2 C.Y. excavator	B-12B	432	.037			1.32	1.92	3.24	4.13
1344	2-1/2 C.Y. excavator	B-12S	765	.021			.74	1.92	2.66	3.25
1346	3 C.Y. excavator	B-12D	900	.018			.63	2.60	3.23	3.83
1348	3-1/2 C.Y. excavator	"	1050	.015			.54	2.23	2.77	3.28
1352	4' to 6' deep, 1/2 C.Y. excavator w/ trench box	B-13H	188	.085			3.03	5.55	8.58	10.75
1354	5/8 C.Y. excavator	"	235	.068			2.42	4.45	6.87	8.60
1356	3/4 C.Y. excavator	B-13G	282	.057			2.02	2.35	4.37	5.70
1358	1 C.Y. excavator/ trench box	B-13D	376	.043			1.51	2.02	3.53	4.53
1360	1-1/2 C.Y. excavator/ trench box	B-13E	508	.032			1.12	1.86	2.98	3.75
1362	6' to 10' deep, 3/4 C.Y. excavator w/trench box	B-13G	212	.075			2.69	3.13	5.82	7.55
1370	1 C.Y. excavator/ trench box	B-13D	376	.043			1.51	2.02	3.53	4.53
1371	1-1/2 C.Y. excavator/ trench box	B-13E	564	.028			1.01	1.67	2.68	3.38
1372	2-1/2 C.Y. excavator/ trench box	B-13J	940	.017			.61	1.68	2.29	2.78
1374	10' to 14' deep, 3/4 C.Y. excavator w/ trench box	B-13G	188	.085			3.03	3.53	6.56	8.50
1375	1 C.Y. excavator/ trench box	B-13D	338	.047			1.69	2.25	3.94	5.05
1376	1-1/2 C.Y. excavator/ trench box	B-13E	508	.032			1.12	1.86	2.98	3.75
1377	2-1/2 C.Y. excavator/ trench box	B-13J	940	.017			.61	1.68	2.29	2.78
1378	3 C.Y. excavator/ trench box	B-13F	1316	.012			.43	1.86	2.29	2.71
1380	3-1/2 C.Y. excavator/ trench box	"	1692	.009			.34	1.45	1.79	2.10
1381	14' to 20' deep, 1 C.Y. excavator w/trench box	B-13D	301	.053			1.89	2.53	4.42	5.65
1382	1-1/2 C.Y. excavator/ trench box	B-13E	451	.035			1.26	2.09	3.35	4.23
1383	2-1/2 C.Y. excavator/ trench box	B-13J	799	.020			.71	1.98	2.69	3.23
1384	3 C.Y. excavator/ trench box	B-13F	940	.017			.61	2.61	3.22	3.80
1385	3-1/2 C.Y. excavator/ trench box	"	1081	.015			.53	2.27	2.80	3.30
1386	20' to 24' deep, 1 C.Y. excavator w/trench box	B-13D	271	.059			2.10	2.80	4.90	6.30
1387	1-1/2 C.Y. excavator/ trench box	B-13E	406	.039			1.40	2.32	3.72	4.70
1388	2-1/2 C.Y. excavator/ trench box	B-13J	719	.022			.79	2.20	2.99	3.63
1389	3 C.Y. excavator/ trench box	B-13F	846	.019			.67	2.90	3.57	4.22
1390	3-1/2 C.Y. excavator/ trench box	"	987	.016			.58	2.48	3.06	3.61
1391	Shoring by SF/day trench wall protected loose matl, 4' W	B-6	3200	.008	SF Wall	.47	.25	.09	.81	.99
1392	Rent shoring per week per SF wall protected, loose matl, 4' W					1.29			1.29	1.42
1395	Hydraulic shoring, SF trench wall protected stable matl, 4' W	2 Clab	2700	.006		.15	.18		.33	.44
1397	semi-stable material, 4' W	"	2400	.007		.21	.20		.41	.55
1398	Rent hyraulic shoring per day/SF wall, stable matl. 4' W					.15			.15	.16
1399	semi-stable material					.21			.21	.24
1400	By hand with pick and shovel 2' to 6' deep, light soil	1 Clab	8	1	B.C.Y.		30.50		30.50	47

31 23 19 – Dewatering

31 23 19.20 Dewatering Systems

	31 23 19.20 Dewatering Systems	Crew	Daily Output	Labor-Hours	Unit	2008 Bare Costs Material	Labor	Equipment	Total	Total Incl O&P
1600	Sump hole construction, incl. excavation and gravel, pit	B-6	1250	.019	C.F.	.91	.63	.23	1.77	2.2
1700	With 12" gravel collar, 12" pipe, corrugated, 16 ga.		70	.343	L.F.	18.75	11.25	4.08	34.08	42
1800	15" pipe, corrugated, 16 ga.		55	.436		24	14.30	5.20	43.50	54
1900	18" pipe, corrugated, 16 ga.		50	.480		28	15.70	5.70	49.40	61
2000	24" pipe, corrugated, 14 ga.		40	.600		33.50	19.65	7.15	60.30	75
2200	Wood lining, up to 4' x 4', add		300	.080	SFCA	15.90	2.62	.95	19.47	22
9950	See Div. 31 23 19.40 for wellpoints									
9960	See Div. 31 23 19.30 for deep well systems									
9970	See Div. 22 11 23 for pumps									

31 23 19.30 Wells

	31 23 19.30 Wells	Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	**WELLS**									
0011	For dewatering 10' to 20' deep, 2' diameter									
0020	with steel casing, minimum	B-6	165	.145	V.L.F.	39	4.76	1.73	45.49	52
0050	Average		98	.245		39	8	2.91	49.91	58
0100	Maximum		49	.490		39	16.05	5.80	60.85	74
0300	For dewatering pumps see 01 54 33 in Reference Section									
0500	For domestic water wells, see Div. 33 21 13.10									

31 23 19.40 Wellpoints

	31 23 19.40 Wellpoints	Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	**WELLPOINTS**									
0011	For equipment rental, see 01 54 33 in Reference Section									
0100	Installation and removal of single stage system									
0110	Labor only, .75 labor-hours per L.F., minimum	1 Clab	10.70	.748	L.F. Hdr.		22.50		22.50	35
0200	2.0 labor-hours per L.F., maximum	"	4	2	"		60.50		60.50	94
0400	Pump operation, 4 @ 6 hr. shifts									
0410	Per 24 hour day	4 Eqlt	1.27	25.197	Day		950		950	1,425
0500	Per 168 hour week, 160 hr. straight, 8 hr. double time		.18	177	Week		6,700		6,700	10,100
0550	Per 4.3 week month		.04	800	Month		30,200		30,200	45,600
0600	Complete installation, operation, equipment rental, fuel &									
0610	removal of system with 2" wellpoints 5' O.C.									
0700	100' long header, 6" diameter, first month	4 Eqlt	3.23	9.907	L.F. Hdr.	148	375		523	730
0800	Thereafter, per month		4.13	7.748		118	292		410	570
1000	200' long header, 8" diameter, first month		6	5.333		131	201		332	450
1100	Thereafter, per month		8.39	3.814		66.50	144		210.50	290
1300	500' long header, 8" diameter, first month		10.63	3.010		52	114		166	228
1400	Thereafter, per month		20.91	1.530		37	58		95	128
1600	1,000' long header, 10" diameter, first month		11.62	2.754		44.50	104		148.50	206
1700	Thereafter, per month		41.81	.765		22	29		51	68
1900	Note: above figures include pumping 168 hrs. per week									
1910	and include the pump operator and one stand-by pump.									

31 23 23 – Fill

31 23 23.13 Backfill

	31 23 23.13 Backfill	Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	**BACKFILL**									
0015	By hand, no compaction, light soil	1 Clab	14	.571	L.C.Y.		17.30		17.30	27
0100	Heavy soil		11	.727	"		22		22	34
0300	Compaction in 6" layers, hand tamp, add to above		20.60	.388	E.C.Y.		11.75		11.75	18
0400	Roller compaction operator walking, add	B-10A	100	.120			4.40	1.43	5.83	8
0500	Air tamp, add	B-9D	190	.211			6.45	1.16	7.61	11
0600	Vibrating plate, add	A-1D	60	.133			4.03	.52	4.55	6
0800	Compaction in 12" layers, hand tamp, add to above	1 Clab	34	.235			7.10		7.10	11
0900	Roller compaction operator walking, add	B-10A	150	.080			2.93	.95	3.88	5
1000	Air tamp, add	B-9	285	.140			4.30	.67	4.97	7
1100	Vibrating plate, add	A-1E	90	.089			2.69	.43	3.12	[illegible]

32 31 26 – Wire Fences and Gates

32 31 26.10 Fences, Misc. Metal

No.	31 26.10 Fences, Misc. Metal	Crew	Daily Output	Labor-Hours	Unit	2008 Bare Costs Material	Labor	Equipment	Total	Total Incl O&P
[illegible]	14 ga., 1" x 2" mesh, 3' high	B-80C	300	.080	L.F.	2.88	2.40	.62	5.90	7.55
[illegible]	5' high	↓	300	.080	↓	3.98	2.40	.62	7	8.80
1000	Kennel fencing, 1-1/2" mesh, 6' long, 3'-6" wide, 6'-2" high	2 Clab	4	4	Ea.	450	121		571	690
1050	12' long		4	4		545	121		666	785
1200	Top covers, 1-1/2" mesh, 6' long		15	1.067		92	32.50		124.50	151
1250	12' long	↓	12	1.333	↓	147	40.50		187.50	225
4500	Security fence, prison grade, set in concrete, 12' high	B-80	25	1.280	L.F.	40	41.50	25	106.50	136
4600	16' high	"	20	1.600	"	48	52	31.50	131.50	167

32 31 26.20 Wire Fencing, General

No.	32 31 26.20 Wire Fencing, General	Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	WIRE FENCING, GENERAL									
0015	Barbed wire, galvanized, domestic steel, hi-tensile 15-1/2 ga.				M.L.F.	33			33	36.50
0020	Standard, 12-3/4 ga.					44.50			44.50	49
0210	Barbless wire, 2-strand galvanized, 12-1/2 ga.				↓	44.50			44.50	49
0500	Helical razor ribbon, stainless steel, 18" dia x 18" spacing				C.L.F.	129			129	142
0600	Hardware cloth galv., 1/4" mesh, 23 ga., 2' wide				C.S.F.	58			58	63.50
0700	3' wide					56.50			56.50	62
0900	1/2" mesh, 19 ga., 2' wide					51			51	56.50
1000	4' wide					50			50	55
1200	Chain link fabric, steel, 2" mesh, 6 ga, galvanized					191			191	211
1300	9 ga, galvanized					94.50			94.50	104
1350	Vinyl coated					79			79	87
1360	Aluminized					123			123	135
1400	2-1/4" mesh, 11.5 ga, galvanized					64			64	70
[illegible]	1-3/4" mesh (tennis courts), 11.5 ga (core), vinyl coated					90.50			90.50	99.50
[illegible]	9 ga, galvanized					81.50			81.50	89.50
[illegible]	Welded wire fabric, galvanized, 1" x 2", 14 ga.					54			54	59.50
2200	2" x 4", 12-1/2 ga.				↓	18.50			18.50	20.50

32 31 29 – Wood Fences and Gates

32 31 29.10 Fence, Wood

No.	32 31 29.10 Fence, Wood	Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	FENCE, WOOD									
0011	Basket weave, 3/8" x 4" boards, 2" x 4"									
0020	stringers on spreaders, 4" x 4" posts									
0050	No. 1 cedar, 6' high	B-80C	160	.150	L.F.	8.85	4.50	1.16	14.51	18.05
0070	Treated pine, 6' high	"	150	.160	"	10.75	4.80	1.24	16.79	20.50
0200	Board fence, 1" x 4" boards, 2" x 4" rails, 4" x 4" post									
0220	Preservative treated, 2 rail, 3' high	B-80C	145	.166	L.F.	6.60	4.96	1.28	12.84	16.35
0240	4' high		135	.178		7.25	5.35	1.38	13.98	17.70
0260	3 rail, 5' high		130	.185		8.15	5.55	1.43	15.13	19.10
0300	6' high		125	.192		9.35	5.75	1.49	16.59	21
0320	No. 2 grade western cedar, 2 rail, 3' high		145	.166		7.20	4.96	1.28	13.44	17
0340	4' high		135	.178		8.50	5.35	1.38	15.23	19.10
0360	3 rail, 5' high		130	.185		9.80	5.55	1.43	16.78	21
0400	6' high		125	.192		10.75	5.75	1.49	17.99	22.50
0420	No. 1 grade cedar, 2 rail, 3' high		145	.166		10.80	4.96	1.28	17.04	21
0440	4' high		135	.178		12.25	5.35	1.38	18.98	23.50
0460	3 rail, 5' high		130	.185		14.20	5.55	1.43	21.18	26
0500	6' high		125	.192		15.80	5.75	1.49	23.04	28
[illegible]	Open rail fence, split rails, 2 rail 3' high, no. 1 cedar		160	.150		5.95	4.50	1.16	11.61	14.85
[illegible]	No. 2 cedar		160	.150		4.64	4.50	1.16	10.30	13.40
0880	3 rail, 4' high, no. 1 cedar		150	.160		8.05	4.80	1.24	14.09	17.65
0890	No. 2 cedar		150	.160		5.30	4.80	1.24	11.34	14.60
0920	Rustic rails, 2 rail 3' high, no. 1 cedar	↓	160	.150	↓	3.72	4.50	1.16	9.38	12.35

33 01 10 – Operation and Maintenance of Water Utilities

33 01 10.20 Pipe Repair		Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
						2008 Bare Costs				
20	3" diameter pipe	1 Plum	15.60	.513	Ea.	99.50	24		123.50	145
[illegible]	3-1/2" diameter pipe		15	.533		109	25		134	158
[illegible]	4" diameter pipe	B-20	40	.600		119	20.50		139.50	163
1750	6" diameter pipe		34	.706		149	24		173	202
1760	8" diameter pipe		21	1.143		199	39		238	280
1770	10" diameter pipe		20	1.200		229	41		270	315
1780	12" diameter pipe		17	1.412		248	48		296	350
1800	For 9" long, add					40%	45%			
1810	For 12" long, add					60%	80%			
1820	For 18" long, add					120%	110%			
2000	Clamp, stainless steel, two section									
2040	Full seal, for iron, steel, PVC pipe									
2100	6" long, 4" diameter pipe	B-20	24	1	Ea.	169	34		203	239
2110	6" diameter pipe		20	1.200		199	41		240	283
2120	8" diameter pipe		13	1.846		219	62.50		281.50	340
2130	10" diameter pipe		12	2		320	68		388	455
2140	12" diameter pipe		10	2.400		350	81.50		431.50	505
2200	9" long, 4" diameter pipe		16	1.500		219	51		270	320
2210	6" diameter pipe		13	1.846		248	62.50		310.50	370
2220	8" diameter pipe		9	2.667		258	90.50		348.50	425
2230	10" diameter pipe		8	3		360	102		462	555
2240	12" diameter pipe		7	3.429		395	116		511	615
2250	14" diameter pipe		6.40	3.750		595	127		722	855
2260	16" diameter pipe		6	4		625	136		761	900
270	18" diameter pipe		5	4.800		645	163		808	965
[illegible]	20" diameter pipe		4.60	5.217		695	177		872	1,050
[illegible]	24" diameter pipe		4	6		1,200	204		1,404	1,625
2320	For 12" long, add to 9"					15%	25%			
2330	For 18" long, add to 9"					70%	55%			
8000	For internal cleaning and inspection, see Div. 33 01 30.16									
8100	For pipe testing, see Div. 23 05 93.50									

33 01 30 – Operation and Maintenance of Sewer Utilities

33 01 30.16 TV Inspection of Sewer Pipelines

		Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	**TV INSPECTION OF SEWER PIPELINES**									
0100	Pipe internal cleaning & inspection, cleaning, pressure pipe systems									
0120	Pig method, lengths 1000' to 10,000'									
0140	4" diameter thru 24" diameter, minimum				L.F.				2.70	3.10
0160	Maximum				"				6.74	8.06
6000	Sewage/sanitary systems									
6100	Power rodder with header & cutters									
6110	*Mobilization charge, minimum*				Total				403.20	472.50
6120	Mobilization charge, maximum				"				945	1,071
6140	4" diameter				L.F.				1.34	1.55
6150	6" diameter								1.69	1.95
6160	8" diameter								2.02	2.35
6170	10" diameter								2.35	2.70
6180	12" diameter								2.56	2.96
6190	14" diameter								2.70	3.10
[illegible]	16" diameter								3.03	3.51
[illegible]	18" diameter								3.38	3.84
6220	20" diameter								3.51	4.04
6230	24" diameter								3.91	4.51

33 05 Common Work Results for Utilities

33 05 23 – Trenchless Utility Installation

05 23.20 Horizontal Boring

05 23.20 Horizontal Boring		Crew	Daily Output	Labor-Hours	Unit	Material	2008 Bare Costs Labor	Equipment	Total	Total Incl O&P
[illegible]	HORIZONTAL BORING									
0011	Casing only, 100' minimum,									
0020	not incl. jacking pits or dewatering									
0100	Roadwork, 1/2" thick wall, 24" diameter casing	B-42	20	3.200	L.F.	90.50	109	68	267.50	345
0200	36" diameter		16	4		144	136	85	365	465
0300	48" diameter		15	4.267		211	145	90.50	446.50	560
0500	Railroad work, 24" diameter		15	4.267		90.50	145	90.50	326	430
0600	36" diameter		14	4.571		144	156	97	397	510
0700	48" diameter		12	5.333		211	182	113	506	645
0900	For ledge, add								195.30	239.40
1000	Small diameter boring, 3", sandy soil	B-82	900	.018		.24	.60	.09	24.69	27
1040	Rocky soil	"	500	.032		.24	1.09	.15	25.24	28
1100	Prepare jacking pits, incl. mobilization & demobilization, minimum				Ea.				2,992	3,543
1101	Maximum				"				17,750.25	21,278.25

33 05 23.22 Directional Drilling

33 05 23.22 Directional Drilling		Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	DIRECTIONAL DRILLING									
0011	Excluding cost of conduit, 100' minimum									
0100	Small equipment to 300', not to exceed 12" diam.									
0102	small unit mobilization to site	B-82A	2	8	Ea.		272	460	732	925
0105	small unit setup per drill		4	4			136	231	367	460
0109	minimum charge gravel, sand & silt, up to 12" diam.		3.20	5		3.75	170	289	462.75	585
0110	*gravel, sand & silt, up to 12" diam.*		300	.053	L.F.	.03	1.81	3.08	4.92	6.20
118	min charge , clay & soft sandstone, up to 10" diam.		3.20	5	Ea.	12.75	170	289	471.75	595
[illegible]	Clay & soft sandstone, up to 10" diam.		300	.053	L.F.	.09	1.81	3.08	4.98	6.25
[illegible]	min charge , hard clay & cobble, up to 8" diam.		1	16	Ea.	.42	545	925	1,512	1,900
0130	Hard clay & cobble, up to 8" diam.		100	.160	L.F.	.42	5.45	9.25	15.12	18.90
0200	Medium equipment to 600', not to exceed 12" diam.									
0202	medium unit mobilization to site	B-82B	2	12	Ea.		395	585	980	1,250
0205	medium unit setup per drill		4	6			197	292	489	620
0209	minimum charge gravel, sand & silt, up to 12" diam.		3.20	7.500		3.75	246	365	614.75	785
0210	gravel, sand & silt, up to 12" diam.		350	.069	L.F.	.03	2.25	3.33	5.61	7.15
0218	min charge , clay & soft sandstone, up to 10" diam.		3.20	7.500	Ea.	12.75	246	365	623.75	795
0220	Clay & soft sandstone, up to 10" diam.		300	.080	L.F.	.09	2.62	3.89	6.60	8.40
0228	min charge , hard clay & cobble, up to 8" diam.		1.78	13.483	Ea.	.42	440	655	1,137	1,450
0230	Hard clay & cobble, up to 8" diam.		150	.160	L.F.	.42	5.25	7.75	13.42	17.05
0300	*Large equipment to 1000', not to exceed 12" diam.*									
0302	large unit mobilization to site	B-82C	2	12	Ea.		395	720	1,115	1,400
0305	large unit setup per drill		4	6			197	360	557	695
0309	minimum charge gravel, sand & silt, up to 12" diam.		4	6		3.75	197	360	560.75	700
0310	gravel, sand & silt, up to 12" diam.		400	.060	L.F.	.03	1.97	3.60	5.60	7
0318	min charge , clay & soft sandstone, up to 12" diam.		3.20	7.500	Ea.	12.75	246	450	708.75	890
0320	Clay & soft sandstone, up to 12" diam.		350	.069	L.F.	.09	2.25	4.11	6.45	8.05
0328	min charge , hard clay & cobble, up to 10" diam.		1.78	13.483	Ea.	.42	440	810	1,292	1,625
0330	Rock & cobble, up to 10" diam.		150	.160	L.F.	.42	5.25	9.60	15.27	19.05
0400	Directional drilling, mud trailer per day	B-82D	1	8	Day		300	267	567	750
1000	Additional charges for mobilization may apply at some locations									

33 05 26 – Utility Line Signs, Markers, and Flags

05 26.10 Utility Accessories

05 26.10 Utility Accessories		Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	UTILITY ACCESSORIES									
0400	Underground tape, detectable, reinforced, alum. foil core, 2"	1 Clab	150	.053	C.L.F.	2	1.61		3.61	4.71
0500	6"	"	140	.057	"	5	1.73		6.73	8.20

33 41 13.50 Piping, Drainage & Sewage, Corrug. HDPE Type S		Crew	Daily Output	Labor-Hours	Unit	2008 Bare Costs Material	Labor	Equipment	Total	Total Incl O&P
0020	Not including excavation & backfill, bell & spigot									
1000	With gaskets, 4" diameter	B-20	425	.056	L.F.	.72	1.92		2.64	[illegible]
1010	6" diameter		400	.060		1.65	2.04		3.69	[illegible]
1020	8" diameter		380	.063		3.15	2.15		5.30	6.80
1030	10" diameter		370	.065		4.36	2.20		6.56	8.25
1040	12" diameter		340	.071		5.95	2.40		8.35	10.25
1050	15" diameter		300	.080		8.05	2.72		10.77	13.10
1060	18" diameter	B-21	275	.102		11.45	3.56	.47	15.48	18.60
1070	24" diameter		250	.112		17.80	3.92	.52	22.24	26
1080	30" diameter		200	.140		28	4.89	.65	33.54	39.50
1090	36" diameter		180	.156		35.50	5.45	.72	41.67	48.50
1100	42" diameter		175	.160		44.50	5.60	.74	50.84	58.50
1110	48" diameter		170	.165		58	5.75	.76	64.51	73
1120	54" diameter		160	.175		89.50	6.10	.81	96.41	108
1130	60" diameter		150	.187		104	6.55	.86	111.41	126
1135	Add 15% to material pipe cost for water tight connection bell & spigot									
1140	HDPE type s, elbows 12" diameter	B-20	11	2.182	Ea.	49	74		123	169
1150	15" diameter	"	9	2.667		76	90.50		166.50	225
1160	18" diameter	B-21	9	3.111		125	109	14.35	248.35	320
1170	24" diameter		9	3.111		266	109	14.35	389.35	475
1180	30" diameter		8	3.500		425	122	16.15	563.15	670
1190	36" diameter		8	3.500		545	122	16.15	683.15	805
1240	HDPE type s, Tee 12" diameter	B-20	7	3.429		111	116		227	305
1260	15" diameter	"	6	4		131	136		267	355
1280	18" diameter	B-21	6	4.667		193	163	21.50	377.50	490
1300	24" diameter		5	5.600		253	196	26	475	615
1320	30" diameter		5	5.600		475	196	26	697	860
1340	36" diameter		4	7		620	245	32.50	897.50	1,100
1360	42" diameter		4	7		1,075	245	32.50	1,352.50	1,600
1380	48" diameter		4	7		1,775	245	32.50	2,052.50	2,375
1400	Add to basic installation cost for each split coupling joint									
1402	HDPE type s, split coupling, 12" diameter	B-20	17	1.412	Ea.	5.40	48		53.40	80.50
1420	15" diameter		15	1.600		6	54.50		60.50	91
1440	18" diameter		13	1.846		10.40	62.50		72.90	109
1460	24" diameter		12	2		15.20	68		83.20	123
1480	30" diameter		10	2.400		25	81.50		106.50	155
1500	36" diameter		9	2.667		32	90.50		122.50	176
1520	42" diameter		8	3		38.50	102		140.50	200
1540	48" diameter		8	3		49.50	102		151.50	213

33 41 13.60 Sewage/Drainage Collection, Concrete Pipe		Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	SEWAGE/DRAINAGE COLLECTION, CONCRETE PIPE									
0020	Not including excavation or backfill									
0050	Box culvert, cast in place, 6' x 6'	C-15	16	4.500	L.F.	181	162		343	450
0060	8' x 8'		14	5.143		266	185		451	580
0070	12' x 12'		10	7.200		520	259		779	975
0100	Box culvert, precast, base price, 8' long, 6' x 3'	B-69	140	.343		283	11.40	9.20	303.60	340
0150	6' x 7'		125	.384		430	12.75	10.30	453.05	500
0200	8' x 3'		133	.361		390	11.95	9.70	411.65	460
0250	8' x 8'		100	.480		525	15.95	12.90	553.85	620
0300	10' x 3'		110	.436		580	14.50	11.75	606.25	670
0350	10' x 8'		80	.600		655	19.90	16.15	691.05	770
0400	12' x 3'		100	.480		560	15.95	12.90	588.85	655

33 42 Culverts

33 42 16 – Concrete Culverts

[illegible] 42 16.15 Oval Arch Culverts		Crew	Daily Output	Labor-Hours	Unit	2008 Bare Costs Material	Labor	Equipment	Total	Total Incl O&P
[illegible]	57" x 38", 12 ga., 48" equivalent	B-13	75	.747	L.F.	73	24.50	10.50	108	130
[illegible]	End sections, 17" x 13"		22	2.545	Ea.	97.50	83.50	35.50	216.50	275
3340	42" x 29"	↓	17	3.294	"	400	108	46.50	554.50	655
3360	Multi-plate arch, steel	B-20	1690	.014	Lb.	1.12	.48		1.60	1.98

33 44 Storm Utility Water Drains

33 44 13 – Utility Area Drains

33 44 13.13 Catchbasins

33 44 13.13 Catchbasins		Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	CATCHBASINS									
0011	Not including footing & excavation									
1580	Curb inlet frame, grate and curb box									
1582	Large 24" x 36" heavy duty	B-24	2	12	Ea.	440	420		860	1,125
1590	Small 10" x 21" medium duty	"	2	12		310	420		730	990
1600	Frames & covers, C.I., 24" square, 500 lb.	B-6	7.80	3.077		249	101	36.50	386.50	470
1700	26" D shape, 600 lb.		7	3.429		425	112	41	578	690
1800	Light traffic, 18" diameter, 100 lb.		10	2.400		139	78.50	28.50	246	305
1900	24" diameter, 300 lb.		8.70	2.759		215	90.50	33	338.50	410
2000	36" diameter, 900 lb.		5.80	4.138		430	136	49	615	735
2100	Heavy traffic, 24" diameter, 400 lb.		7.80	3.077		208	101	36.50	345.50	425
2200	36" diameter, 1150 lb.		3	8		690	262	95	1,047	1,275
2300	Mass. State standard, 26" diameter, 475 lb.		7	3.429		520	112	41	673	795
[illegible]	30" diameter, 620 lb.		7	3.429		330	112	41	483	585
[illegible]	Watertight, 24" diameter, 350 lb.		7.80	3.077		355	101	36.50	492.50	585
[illegible]	26" diameter, 500 lb.		7	3.429		335	112	41	488	590
2700	32" diameter, 575 lb.	↓	6	4	↓	745	131	47.50	923.50	1,075
2800	3 piece cover & frame, 10" deep,									
2900	1200 lbs., for heavy equipment	B-6	3	8	Ea.	1,075	262	95	1,432	1,675
3000	Raised for paving 1-1/4" to 2" high,									
3100	4 piece expansion ring									
3200	20" to 26" diameter	1 Clab	3	2.667	Ea.	117	80.50		197.50	253
3300	30" to 36" diameter	"	3	2.667	"	162	80.50		242.50	305
3320	Frames and covers, existing, raised for paving, 2", including									
3340	row of brick, concrete collar, up to 12" wide frame	B-6	18	1.333	Ea.	36.50	43.50	15.85	95.85	124
3360	20" to 26" wide frame		11	2.182		57.50	71.50	26	155	202
3380	30" to 36" wide frame	↓	9	2.667		71	87.50	31.50	190	248
3400	Inverts, single channel brick	D-1	3	5.333		80	186		266	370
3500	Concrete		5	3.200		62.50	112		174.50	239
3600	Triple channel, brick		2	8		121	279		400	560
3700	Concrete	↓	3	5.333	↓	107	186		293	400

33 47 Ponds and Reservoirs

33 47 13 – Pond and Reservoir Liners

33 47 13.53 Reservoir Liners HDPE		Crew	Daily Output	Labor-Hours	Unit	2008 Bare Costs Material	Labor	Equipment	Total	Total Incl O&P
0010	RESERVOIR LINERS HDPE									
0011	membrane lining									
1100	30 mil thick	3 Skwk	1850	.013	S.F.	.35	.51		.86	1.18
1200	60 mil thick		1600	.015	"	.65	.59		1.24	1.63
1220	60 mil thick		1.60	15	M.S.F.	650	590		1,240	1,625
1300	120 mil thick		1440	.017	S.F.	1.47	.66		2.13	2.64

33 49 Storm Drainage Structures

33 49 13 – Storm Drainage Manholes, Frames, and Covers

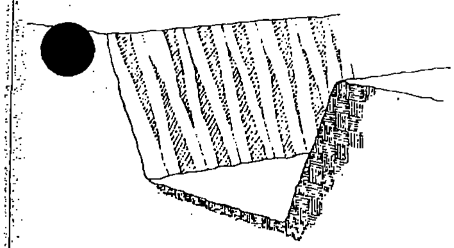
33 49 13.10 Storm Drainage Manholes, Frames and Covers

33 49 13.10 Storm Drainage Manholes, Frames and Covers		Crew	Daily Output	Labor-Hours	Unit	Material	Labor	Equipment	Total	Total Incl O&P
0010	STORM DRAINAGE MANHOLES, FRAMES & COVERS									
0020	Excludes footing, excavation, backfill (See line items for frame & cover)									
0050	Brick, 4' inside diameter, 4' deep	D-1	1	16	Ea.	395	560		955	1,275
0100	6' deep		.70	22.857		555	795		1,350	1,825
0150	8' deep		.50	32		710	1,125		1,835	2,475
0200	For depths over 8', add		4	4	V.L.F.	147	140		287	375
0400	Concrete blocks (radial), 4' I.D., 4' deep		1.50	10.667	Ea.	340	370		710	940
0500	6' deep		1	16		450	560		1,010	1,350
0600	8' deep		.70	22.857		560	795		1,355	1,850
0700	For depths over 8', add		5.50	2.909	V.L.F.	57.50	101		158.50	217
0800	Concrete, cast in place, 4' x 4', 8" thick, 4' deep	C-14H	2	24	Ea.	510	905	12.50	1,427.50	1,975
0900	6' deep		1.50	32		740	1,200	16.65	1,956.65	2,700
1000	8' deep		1	48		1,050	1,800	25	2,875	4,025
1100	For depths over 8', add		8	6	V.L.F.	120	227	3.12	350.12	490
1110	Precast, 4' I.D., 4' deep	B-22	4.10	7.317	Ea.	680	259	47.50	986.50	1,200
1120	6' deep		3	10		850	355	64.50	1,269.50	1,550
1130	8' deep		2	15		1,025	530	97	1,652	2,050
1140	For depths over 8', add		16	1.875	V.L.F.	139	66.50	12.15	217.65	268
1150	5' I.D., 4' deep	B-6	3	8	Ea.	700	262	95	1,057	1,275
1160	6' deep		2	12		945	395	143	1,483	1,800
1170	8' deep		1.50	16		1,200	525	190	1,915	2,325
1180	For depths over 8', add		12	2	V.L.F.	155	65.50	24	244.50	298
1190	6' I.D., 4' deep		2	12	Ea.	1,150	395	143	1,688	2,000
1200	6' deep		1.50	16		1,500	525	190	2,215	2,650
1210	8' deep		1	24		1,825	785	285	2,895	3,550
1220	For depths over 8', add		8	3	V.L.F.	240	98.50	35.50	374	455
1250	Slab tops, precast, 8" thick									
1300	4' diameter manhole	B-6	8	3	Ea.	161	98.50	35.50	295	365
1400	5' diameter manhole		7.50	3.200		315	105	38	458	555
1500	6' diameter manhole		7	3.429		460	112	41	613	725
3800	Steps, heavyweight cast iron, 7" x 9"	1 Bric	40	.200		12.95	7.85		20.80	26
3900	8" x 9"		40	.200		19.45	7.85		27.30	33.50
3928	12" x 10-1/2"		40	.200		18.40	7.85		26.25	32
4000	Standard sizes, galvanized steel		40	.200		15.60	7.85		23.45	29
4100	Aluminum		40	.200		21	7.85		28.85	35.50

G1030 Site Earthwork

1030 105	Cut & Fill Gravel	COST PER C.Y. EQUIP.	COST PER C.Y. LABOR	COST PER C.Y. TOTAL
[illegible]	300' haul, 6" lift, 2 passes	5.60	3.35	8.95
2650	4 passes	5.70	3.48	9.18
2700	12" lift, 2 passes	5.55	3.26	8.81
2750	4 passes	5.65	3.39	9.04
3000	300 HP dozer & roller compactors, 150' haul, 6" lift, 2 passes	2.69	1.39	4.08
3050	4 passes	2.79	1.52	4.31
3100	12" lift, 2 passes	2.62	1.30	3.92
3150	4 passes	2.72	1.43	4.15
3200	300' haul, 6" lift, 2 passes	4.61	2.23	6.84
3250	4 passes	4.71	2.36	7.07
3300	12" lift, 2 passes	4.54	2.14	6.68
3350	4 passes	4.64	2.27	6.91
4200	10 C.Y. elevating scraper & roller compacter, 1500'haul, 6"lift, 2 passes	2.89	1.82	4.71
4250	4 passes	3.21	2.14	5.35
4300	12" lift, 2 passes	2.71	1.64	4.35
4350	4 passes	2.92	1.86	4.78
4800	5000' haul, 6" lift, 2 passes	3.64	2.24	5.88
4850	4 passes	3.96	2.56	6.52
4900	12" lift, 2 passes	3.46	2.06	5.52
4950	4 passes	3.67	2.28	5.95
5000	15 C.Y. S.P. scraper & roller compactor, 1500' haul, 6" lift, 2 passes	3.53	1.54	5.07
5050	4 passes	3.85	1.86	5.71
5100	12" lift, 2 passes	3.35	1.36	4.71
5150	4 passes	3.56	1.58	5.14
5400	5000' haul, 6" lift, 2 passes	4.66	1.90	6.56
[illegible]50	4 passes	4.98	2.22	7.20
[illegible]	12" lift, 2 passes	4.48	1.72	6.20
5[illegible]	4 passes	4.69	1.94	6.63
5600	21 C.Y. S.P. scraper & roller compactor, 1500' haul, 6" lift, 2 passes	3.82	1.35	5.17
5650	4 passes	4.14	1.67	5.81
5700	12" lift, 2 passes	3.64	1.17	4.81
5750	4 passes	3.85	1.39	5.24
6000	5000' haul, 6" lift, 2 passes	5.50	1.73	7.23
6050	4 passes	5.85	2.05	7.90
6100	12" lift, 2 passes	5.35	1.55	6.90
6150	4 passes	5.55	1.77	7.32

G1030 Site Earthwork



Trenching Systems are shown on a cost per linear foot basis. The systems include: excavation; backfill and removal of spoil; and compaction for various depths and trench bottom widths. The backfill has been reduced to accommodate a pipe of suitable diameter and bedding.

The slope for trench sides varies from none to 1:1.

The Expanded System Listing shows Trenching Systems that range from 2′ to 12′ in width. Depths range from 2′ to 25′.

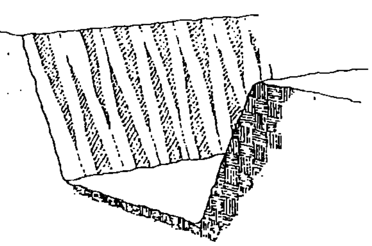
System Components	QUANTITY	UNIT	COST PER L.F. EQUIP.	COST PER L.F. LABOR	COST PER L.F. TOTAL
SYSTEM G1030 805 1310					
TRENCHING COMMON EARTH, NO SLOPE, 2′ WIDE, 2′ DP, 3/8 C.Y. BUCKET					
Excavation, trench, hyd. backhoe, track mtd., 3/8 C.Y. bucket	.148	C.Y.	.31	.84	1.15
Backfill and load spoil, from stockpile	.153	C.Y.	.09	.26	.35
Compaction by vibrating plate, 6″ lifts, 4 passes	.118	E.C.Y.	.03	.32	.35
Remove excess spoil, 8 C.Y. dump truck, 2 mile roundtrip	.040	C.Y.	.14	.15	.29
TOTAL			.57	1.57	2.14

G1030 805	Trenching Common Earth	COST PER L.F. EQUIP.	COST PER L.F. LABOR	COST PER L.F. TOTAL
1310	Trenching, common earth, no slope, 2′ wide, 2′ deep, 3/8 C.Y. bucket	.57	1.57	2.14
1320	3′ deep, 3/8 C.Y. bucket	.81	2.36	3.17
[illegible]	4′ deep, 3/8 C.Y. bucket	1.03	3.14	4.17
134[illegible]	6′ deep, 3/8 C.Y. bucket	1.40	4.06	5.46
135[illegible]	8′ deep, 1/2 C.Y. bucket	1.82	5.35	7.17
1360	10′ deep, 1 C.Y. bucket	2.84	6.40	9.24
1400	4′ wide, 2′ deep, 3/8 C.Y. bucket	1.32	3.13	4.45
1410	3′ deep, 3/8 C.Y. bucket	1.78	4.69	6.47
1420	4′ deep, 1/2 C.Y. bucket	2.06	5.20	7.26
1430	6′ deep, 1/2 C.Y. bucket	3.33	8.30	11.63
1440	8′ deep, 1/2 C.Y. bucket	5.35	10.70	16.05
1450	10′ deep, 1 C.Y. bucket	6.50	13.30	19.80
1460	12′ deep, 1 C.Y. bucket	8.40	16.90	25.30
1470	15′ deep, 1-1/2 C.Y. bucket	7.45	15.10	22.55
1480	18′ deep, 2-1/2 C.Y. bucket	10.30	21	31.30
1520	6′ wide, 6′ deep, 5/8 C.Y. bucket w/trench box	7.40	12.50	19.90
1530	8′ deep, 3/4 C.Y. bucket	9.55	16.15	25.70
1540	10′ deep, 1 C.Y. bucket	9.45	16.80	26.25
1550	12′ deep, 1-1/2 C.Y. bucket	10.15	18.05	28.20
1560	16′ deep, 2-1/2 C.Y. bucket	13.80	22	35.80
1570	20′ deep, 3-1/2 C.Y. bucket	19.50	27	46.50
1580	24′ deep, 3-1/2 C.Y. bucket	23.50	32.50	56
1640	8′ wide, 12′ deep, 1-1/2 C.Y. bucket w/trench box	14.25	23	37.25
1650	15′ deep, 1-1/2 C.Y. bucket	18.60	30	48.60
1660	18′ deep, 2-1/2 C.Y. bucket	20	29.50	49.50
1680	24′ deep, 3-1/2 C.Y. bucket	31.50	42	73.50
1730	10′ wide, 20′ deep, 3-1/2 C.Y. bucket w/trench box	25	40	65
1740	24′ deep, 3-1/2 C.Y. bucket	38.50	48	86.50
1800	1/2 to 1 slope, 2′ wide, 2′ deep, 3/8 C.Y. bucket	.81	2.36	3.17
[illegible]	3′ deep, 3/8 C.Y. bucket	1.33	4.12	5.45
18[illegible]	4′ deep, 3/8 C.Y. bucket	1.97	6.25	8.22
1840	6′ deep, 3/8 C.Y. bucket	3.35	10.20	13.55
1860	8′ deep, 1/2 C.Y. bucket	5.25	16.20	21.45
1880	10′ deep, 1 C.Y. bucket	9.80	22.50	32.30

G1030 805	Trenching Common Earth	COST PER L.F.		
		EQUIP.	LABOR	TOTAL
2300	4' wide, 2' deep, 3/8 C.Y. bucket	1.55	3.91	5.46
2310	3' deep, 3/8 C.Y. bucket	2.31	6.45	8.76
2320	4' deep, 1/2 C.Y. bucket	2.94	7.90	10.84
2340	6' deep, 1/2 C.Y. bucket	5.60	14.70	20.30
2360	8' deep, 1/2 C.Y. bucket	10.35	21.50	31.85
2380	10' deep, 1 C.Y. bucket	14.40	30.50	44.90
2400	12' deep, 1 C.Y. bucket	19.10	41	60.10
2430	15' deep, 1-1/2 C.Y. bucket	21	44	65
2460	18' deep, 2-1/2 C.Y. bucket	37	67.50	104.50
2840	6' wide, 6' deep, 5/8 C.Y. bucket w/trench box	10.65	18.25	28.90
2860	8' deep, 3/4 C.Y. bucket	15.45	27.50	42.95
2880	10' deep, 1 C.Y. bucket	15.20	28	43.20
2900	12' deep, 1-1/2 C.Y. bucket	19.20	36.50	55.70
2940	16' deep, 2-1/2 C.Y. bucket	31.50	52.50	84
2980	20' deep, 3-1/2 C.Y. bucket	48.50	72.50	121
3020	24' deep, 3-1/2 C.Y. bucket	69	99	168
3100	8' wide, 12' deep, 1-1/2 C.Y. bucket w/trench box	24	41.50	65.50
3120	15' deep, 1-1/2 C.Y. bucket	34.50	60.50	95
3140	18' deep, 2-1/2 C.Y. bucket	43.50	70.50	114
3180	24' deep, 3-1/2 C.Y. bucket	77.50	108	185.50
3270	10' wide, 20' deep, 3-1/2 C.Y. bucket w/trench box	48.50	83.50	132
3280	24' deep, 3-1/2 C.Y. bucket	85.50	118	203.50
3370	12' wide, 20' deep, 3-1/2 C.Y. bucket w/ trench box	72	97	169
3380	25' deep, 3-1/2 C.Y. bucket	100	138	238
3500	1 to 1 slope, 2' wide, 2' deep, 3/8 C.Y. bucket	1.03	3.14	4.17
3520	3' deep, 3/8 C.Y. bucket	3.07	7.25	10.32
3540	4' deep, 3/8 C.Y. bucket	2.90	9.40	12.30
3560	6' deep, 3/8 C.Y. bucket	3.35	10.15	13.50
3580	8' deep, 1/2 C.Y. bucket	6.55	20.50	27.05
3600	10' deep, 1 C.Y. bucket	16.70	38.50	55.20
3800	4' wide, 2' deep, 3/8 C.Y. bucket	1.78	4.69	6.47
3820	3' deep, 3/8 C.Y. bucket	2.82	8.20	11.02
3840	4' deep, 1/2 C.Y. bucket	3.80	10.60	14.40
3860	6' deep, 1/2 C.Y. bucket	7.90	21	28.90
3880	8' deep, 1/2 C.Y. bucket	15.40	32.50	47.90
3900	10' deep, 1 C.Y. bucket	22.50	47.50	70
3920	12' deep, 1 C.Y. bucket	33	68.50	101.50
3940	15' deep, 1-1/2 C.Y. bucket	34.50	73	107.50
3960	18' deep, 2-1/2 C.Y. bucket	51	93	144
4030	6' wide, 6' deep, 5/8 C.Y. bucket w/trench box	14	24.50	38.50
4040	8' deep, 3/4 C.Y. bucket	20.50	34	54.50
4050	10' deep, 1 C.Y. bucket	22	41	63
4060	12' deep, 1-1/2 C.Y. bucket	29.50	55.50	85
4070	16' deep, 2-1/2 C.Y. bucket	49	83.50	132.50
4080	20' deep, 3-1/2 C.Y. bucket	78.50	118	196.50
4090	24' deep, 3-1/2 C.Y. bucket	115	166	281
4500	8' wide, 12' deep, 1-1/2 C.Y. bucket w/trench box	33.50	60.50	94
4550	15' deep, 1-1/2 C.Y. bucket	51	91	142
4600	18' deep, 2-1/2 C.Y. bucket	66	109	175
4650	24' deep, 3-1/2 C.Y. bucket	123	175	298
4800	10' wide, 20' deep, 3-1/2 C.Y. bucket w/trench box	71.50	127	198.50
4850	24' deep, 3-1/2 C.Y. bucket	131	185	316
4950	12' wide, 20' deep, 3-1/2 C.Y. bucket w/ trench box	104	143	247
4980	25' deep, 3-1/2 C.Y. bucket	149	209	358

G10 Site Preparation

G1030 Site Earthwork



Trenching Systems are shown on a cost per linear foot basis. The systems include: excavation; backfill and removal of spoil; and compaction for various depths and trench bottom widths. The backfill has been reduced to accommodate a pipe of suitable diameter and bedding.

The slope for trench sides varies from none to 1:1.

The Expanded System Listing shows Trenching Systems that range from 2′ to 12′ in width. Depths range from 2′ to 25′.

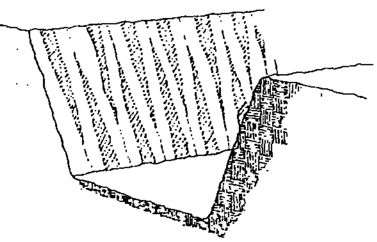
System Components	QUANTITY	UNIT	COST PER L.F. EQUIP.	LABOR	TOTAL
SYSTEM G1030 806 1310					
TRENCHING LOAM & SANDY CLAY, NO SLOPE, 2′ WIDE, 2′ DP, 3/8 C.Y. BUCKET					
Excavation, trench, hyd. backhoe, track mtd., 3/8 C.Y. bucket	.148	B.C.Y.	.29	.78	1.07
Backfill and load spoil, from stockpile	.165	C.Y.	.10	.28	.38
Compaction by vibrating plate 18″ wide, 6″ lifts, 4 passes	.118	E.C.Y.	.03	.32	.35
Remove excess spoil, 8 C.Y. dump truck, 2 mile roundtrip	.042	C.Y.	.14	.16	.30
TOTAL			.57	1.57	2.14

G1030 806	Trenching Loam & Sandy Clay	COST PER L.F. EQUIP.	LABOR	TOTAL
1310	Trenching, loam & sandy clay, no slope, 2′ wide, 2′ deep, 3/8 C.Y. bucket	.56	1.54	2.10
320	3′ deep, 3/8 C.Y. bucket	.87	2.53	3.40
30	4′ deep, 3/8 C.Y. bucket	1	3.07	4.07
[illegible]	6′ deep, 3/8 C.Y. bucket	1.48	3.64	5.10
1350	8′ deep, 1/2 C.Y. bucket	1.93	4.79	6.70
1360	10′ deep, 1 C.Y. bucket	2.13	5.15	7.30
1400	4′ wide, 2′ deep, 3/8 C.Y. bucket	1.32	3.08	4.40
1410	3′ deep, 3/8 C.Y. bucket	1.78	4.61	6.40
1420	4′ deep, 1/2 C.Y. bucket	2.05	5.10	7.15
1430	6′ deep, 1/2 C.Y. bucket	3.51	7.40	10.90
1440	8′ deep, 1/2 C.Y. bucket	5.20	10.55	15.75
1450	10′ deep, 1 C.Y. bucket	5.10	10.80	15.90
1460	12′ deep, 1 C.Y. bucket	6.40	13.45	19.85
1470	15′ deep, 1-1/2 C.Y. bucket	7.75	15.65	23.50
1480	18′ deep, 2-1/2 C.Y. bucket	9.25	16.90	26
1520	6′ wide, 6′ deep, 5/8 C.Y. bucket w/trench box	7.15	12.30	19.45
1530	8′ deep, 3/4 C.Y. bucket	9.15	15.85	25
1540	10′ deep, 1 C.Y. bucket	8.70	16.15	25
1550	12′ deep, 1-1/2 C.Y. bucket	9.85	18.10	28
1560	16′ deep, 2-1/2 C.Y. bucket	13.40	22.50	36
1570	20′ deep, 3-1/2 C.Y. bucket	17.80	27	45
1580	24′ deep, 3-1/2 C.Y. bucket	22.50	33	55.50
1640	8′ wide, 12′ deep, 1-1/4 C.Y. bucket w/trench box	14.05	23	37
1650	15′ deep, 1-1/2 C.Y. bucket	17.15	29	46
1660	18′ deep, 2-1/2 C.Y. bucket	20.50	32.50	53
1680	24′ deep, 3-1/2 C.Y. bucket	30.50	42.50	73
1730	10′ wide, 20′ deep, 3-1/2 C.Y. bucket w/trench box	31	43	74
1740	24′ deep, 3-1/2 C.Y. bucket	38.50	52.50	91
1780	12′ wide, 20′ deep, 3-1/2 C.Y. bucket w/trench box	37	51	88
90	25′ deep, bucket	48.50	65.50	114
[illegible]	1/2:1 slope, 2′ wide, 2′ deep, 3/8 C.Y. BK	.79	2.31	3.10
1810	3′ deep, 3/8 C.Y. bucket	1.29	4.03	5.30
1820	4′ deep, 3/8 C.Y. bucket	1.92	6.15	8.05
1840	6′ deep, 3/8 C.Y. bucket	3.54	9.10	12.65

G1030 Site Earthwork

G1030 806	Trenching Loam & Sandy Clay	COST PER L.F.		
		EQUIP.	LABOR	TOTAL
1860	8' deep, 1/2 C.Y. bucket	5.60	14.50	20
1880	10' deep, 1 C.Y. bucket	7.25	18.20	25.50
2300	4' wide, 2' deep, 3/8 C.Y. bucket	1.55	3.84	5.40
2310	3' deep, 3/8 C.Y. bucket	2.29	6.35	8.65
2320	4' deep, 1/2 C.Y. bucket	2.91	7.75	10.65
2340	6' deep, 1/2 C.Y. bucket	5.90	13.20	19.10
2360	8' deep, 1/2 C.Y. bucket	10.05	21.50	31.50
2380	10' deep, 1 C.Y. bucket	11.15	25	36
2400	12' deep, 1 C.Y. bucket	18.65	41	59.50
2430	15' deep, 1-1/2 C.Y. bucket	22	45.50	67.50
2460	18' deep, 2-1/2 C.Y. bucket	36	68.50	105
2840	6' wide, 6' deep, 5/8 C.Y. bucket w/trench box	10.35	18.50	29
2860	8' deep, 3/4 C.Y. bucket	14.80	27	42
2880	10' deep, 1 C.Y. bucket	15.45	30.50	46
2900	12' deep, 1-1/2 C.Y. bucket	19.15	37	56
2940	16' deep, 2-1/2 C.Y. bucket	30.50	53.50	84
2980	20' deep, 3-1/2 C.Y. bucket	46.50	73.50	120
3020	24' deep, 3-1/2 C.Y. bucket	66.50	100	167
3100	8' wide, 12' deep, 1-1/2 C.Y. bucket w/trench box	23.50	42	65.50
3120	15' deep, 1-1/2 C.Y. bucket	31.50	59	90.50
3140	18' deep, 2-1/2 C.Y. bucket	42	71.50	114
3180	24' deep, 3-1/2 C.Y. bucket	74.50	110	185
3270	10' wide, 20' deep, 3-1/2 C.Y. bucket w/trench box	59.50	89	149
3280	24' deep, 3-1/2 C.Y. bucket	82.50	120	203
3320	12' wide, 20' deep, 3-1/2 C.Y. bucket w/trench box	66	97	163
3380	25' deep, 3-1/2 C.Y. bucket w/trench box	90.50	130	221
3500	1:1 slope, 2' wide, 2' deep, 3/8 C.Y. bucket	1	3.07	4.07
3520	3' deep, 3/8 C.Y. bucket	1.81	5.75	7.55
3540	4' deep, 3/8 C.Y. bucket	2.82	9.20	12
3560	6' deep, 3/8 C.Y. bucket	3.54	9.10	12.65
3580	8' deep, 1/2 C.Y. bucket	9.25	24	33.50
3600	10' deep, 1 C.Y. bucket	12.35	31	43.50
3800	2' deep, 3/8 C.Y. bucket	1.78	4.62	6.40
3820	4' wide, 3' deep, 3/8 C.Y. bucket	2.79	8.05	10.85
3840	4' deep, 1/2 C.Y. bucket	3.75	10.40	14.15
3860	6' deep, 1/2 C.Y. bucket	8.30	19	27.50
3880	8' deep, 1/2 C.Y. bucket	14.95	32	47
3900	10' deep, 1 C.Y. bucket	17.20	39	56
3920	12' deep, 1 C.Y. bucket	25	55	80
3940	15' deep, 1-1/2 C.Y. bucket	36	75.50	112
3960	18' deep, 2-1/2 C.Y. bucket	50	94.50	145
4030	6' wide, 6' deep, 5/8 C.Y. bucket w/trench box	13.55	24.50	38
4040	8' deep, 3/4 C.Y. bucket	20.50	38	58.50
4050	10' deep, 1 C.Y. bucket	22	44.50	66.50
4060	12' deep, 1-1/2 C.Y. bucket	28.50	56	84.50
4080	20' deep, 3-1/2 C.Y. bucket	75.50	120	196
4090	24' deep, 3-1/2 C.Y. bucket	110	168	278
4500	8' wide, 12' deep, 1-1/4 C.Y. bucket w/trench box	32.50	61	93.50
4550	15' deep, 1-1/2 C.Y. bucket	46	88.50	135
4600	18' deep, 2-1/2 C.Y. bucket	64	111	175
4650	24' deep, 3-1/2 C.Y. bucket	118	178	296
4800	10' wide, 20' deep, 3-1/2 C.Y. bucket w/trench box	88.50	136	225
4850	24' deep, 3-1/2 C.Y. bucket	126	188	315
4950	12' wide, 20' deep, 3-1/2 C.Y. bucket w/trench box	95	144	239
4980	25' deep, bucket	144	212	355

G1030 Site Earthwork



Trenching Systems are shown on a cost per linear foot basis. The systems include: excavation; backfill and removal of spoil; and compaction for various depths and trench bottom widths. The backfill has been reduced to accommodate a pipe of suitable diameter and bedding.

The slope for trench sides varies from none to 1:1.

The Expanded System Listing shows Trenching Systems that range from 2′ to 12′ in width. Depths range from 2′ to 25′.

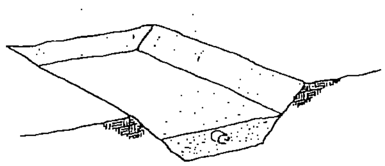
System Components	QUANTITY	UNIT	COST PER L.F. EQUIP.	LABOR	TOTAL
SYSTEM G1030 807 1310					
TRENCHING SAND & GRAVEL, NO SLOPE, 2′ WIDE, 2′ DEEP, 3/8 C.Y. BUCKET					
Excavation, trench, hyd. backhoe, track mtd., 3/8 C.Y. bucket	.148	B.C.Y.	.28	.77	1.05
Backfill and load spoil, from stockpile	.118	C.Y.	.07	.20	.27
Compaction by vibrating plate 18″ wide, 6″ lifts, 4 passes	.118	E.C.Y.	.03	.32	.35
Remove excess spoil, 8 C.Y. dump truck, 2 mile roundtrip	.035	C.Y.	.12	.13	.25
TOTAL			.50	1.42	1.92

G1030 807	Trenching Sand & Gravel	COST PER L.F. EQUIP.	LABOR	TOTAL
1310	Trenching, sand & gravel, no slope, 2′ wide, 2′ deep, 3/8 C.Y. bucket	.50	1.42	1.92
1320	3′ deep, 3/8 C.Y. bucket	.82	2.43	3.25
1330	4′ deep, 3/8 C.Y. bucket	.93	2.91	3.84
1340	6′ deep, 3/8 C.Y. bucket	1.40	3.47	4.87
1350	8′ deep, 1/2 C.Y. bucket	1.84	4.57	6.40
1360	10′ deep, 1 C.Y. bucket	1.99	4.84	6.85
1400	4′ wide, 2′ deep, 3/8 C.Y. bucket	1.19	2.90	4.09
1410	3′ deep, 3/8 C.Y. bucket	1.62	4.36	6
1420	4′ deep, 1/2 C.Y. bucket	1.89	4.82	6.70
1430	6′ deep, 1/2 C.Y. bucket	3.34	7.10	10.45
1440	8′ deep, 1/2 C.Y. bucket	4.91	10	14.90
1450	10′ deep, 1 C.Y. bucket	4.80	10.20	15
1460	12′ deep, 1 C.Y. bucket	6.05	12.75	18.80
1470	15′ deep, 1-1/2 C.Y. bucket	7.35	14.75	22
1480	18′ deep, 2-1/2 C.Y. bucket	8.70	15.85	24.50
1520	6′ wide, 6′ deep, 5/8 C.Y. bucket w/trench box	6.75	11.60	18.35
1530	8′ deep, 3/4 C.Y. bucket	8.70	15.05	24
1540	10′ deep, 1 C.Y. bucket	8.20	15.25	23.50
1550	12′ deep, 1-1/2 C.Y. bucket	9.35	17.05	26.50
1560	16′ deep, 2 C.Y. bucket	12.80	21	34
1570	20′ deep, 3-1/2 C.Y. bucket	16.90	25.50	42.50
1580	24′ deep, 3-1/2 C.Y. bucket	21.50	31	52.50
1640	8′ wide, 12′ deep, 1-1/2 C.Y. bucket w/trench box	13.20	21.50	34.50
1650	15′ deep, 1-1/2 C.Y. bucket	16.05	27.50	43.50
1660	18′ deep, 2-1/2 C.Y. bucket	19.35	30	49.50
1680	24′ deep, 3-1/2 C.Y. bucket	29	40	69
1730	10′ wide, 20′ deep, 3-1/2 C.Y. bucket w/trench box	29	40	69
1740	24′ deep, 3-1/2 C.Y. bucket	36.50	49.50	86
1780	12′ wide, 20′ deep, 3-1/2 C.Y. bucket w/trench box	35	47.50	82.50
1790	25′ deep, bucket	46	61	107
1800	1/2:1 slope, 2′ wide, 2′ deep, 3/8 CY bk	.73	2.19	2.92
1810	3′ deep, 3/8 C.Y. bucket	1.21	3.83	5.05
1820	4′ deep, 3/8 C.Y. bucket	1.80	5.85	7.65
1840	6′ deep, 3/8 C.Y. bucket	3.38	8.70	12.10

G1030 Site Earthwork

G1030 807	Trenching Sand & Gravel	COST PER L.F.		
		EQUIP.	LABOR	TOTAL
1860	8' deep, 1/2 C.Y. bucket	5.35	13.85	19
1880	10' deep, 1 C.Y. bucket	6.80	17.15	24
2300	4' wide, 2' deep, 3/8 C.Y. bucket	1.41	3.63	5
2310	3' deep, 3/8 C.Y. bucket	2.10	6	8
2320	4' deep, 1/2 C.Y. bucket	2.69	7.35	10
2340	6' deep, 1/2 C.Y. bucket	5.65	12.65	18
2360	8' deep, 1/2 C.Y. bucket	9.55	20	29
2380	10' deep, 1 C.Y. bucket	10.55	23.50	34
2400	12' deep, 1 C.Y. bucket	17.70	39	56
2430	15' deep, 1-1/2 C.Y. bucket	20.50	43	63
2460	18' deep, 2-1/2 C.Y. bucket	34.50	64.50	99
2840	6' wide, 6' deep, 5/8 C.Y. bucket w/trench box	9.80	17.50	27
2860	8' deep, 3/4 C.Y. bucket	14.10	25.50	39
2880	10' deep, 1 C.Y. bucket	14.65	28.50	43
2900	12' deep, 1-1/2 C.Y. bucket	18.15	35	53
2940	16' deep, 2 C.Y. bucket	29.50	50.50	80
2980	20' deep, 3-1/2 C.Y. bucket	44.50	69	114
3020	24' deep, 3-1/2 C.Y. bucket	63.50	94.50	158
3100	8' wide, 12' deep, 1-1/4 C.Y. bucket w/trench box	22	39.50	61
3120	15' deep, 1-1/2 C.Y. bucket	30	55.50	85
3140	18' deep, 2-1/2 C.Y. bucket	40	67	107
3180	24' deep, 3-1/2 C.Y. bucket	71	103	174
3270	10' wide, 20' deep, 3-1/2 C.Y. bucket w/trench box	56.50	83.50	140
3280	24' deep, 3-1/2 C.Y. bucket	78.50	113	192
3370	12' wide, 20' deep, 3-1/2 C.Y. bucket w/trench box	63	93	156
3380	25' deep, bucket	91.50	130	222
3500	1:1 slope, 2' wide, 2' deep, 3/8 CY bk	1.73	3.73	5
3520	3' deep, 3/8 C.Y. bucket	1.69	5.45	7
3540	4' deep, 3/8 C.Y. bucket	2.65	8.75	11
3560	6' deep, 3/8 C.Y. bucket	3.38	8.70	12
3580	8' deep, 1/2 C.Y. bucket	8.85	23	32
3600	10' deep, 1 C.Y. bucket	11.60	29.50	41
3800	4' wide, 2' deep, 3/8 C.Y. bucket	1.62	4.36	6
3820	3' deep, 3/8 C.Y. bucket	2.58	7.65	10
3840	4' deep, 1/2 C.Y. bucket	3.47	9.90	13
3860	6' deep, 1/2 C.Y. bucket	7.95	18.20	26
3880	8' deep, 1/2 C.Y. bucket	14.20	30.50	44
3900	10' deep, 1 C.Y. bucket	16.30	36.50	53
3920	12' deep, 1 C.Y. bucket	23.50	52	75
3940	15' deep, 1-1/2 C.Y. bucket	34	71.50	106
3960	18' deep, 2-1/2 C.Y. bucket	47	89	136
4030	6' wide, 6' deep, 5/8 C.Y. bucket w/trench box	12.85	23.50	36.5
4040	8' deep, 3/4 C.Y. bucket	19.55	36	55.5
4050	10' deep, 1 C.Y. bucket	21	42	63
4060	12' deep, 1-1/2 C.Y. bucket	27	53	80
4070	16' deep, 2 C.Y. bucket	45.50	79.50	125
4080	20' deep, 3-1/2 C.Y. bucket	72	112	184
4090	24' deep, 3-1/2 C.Y. bucket	105	158	263
4500	8' wide, 12' deep, 1-1/2 C.Y. bucket w/trench box	31	57.50	88.5
4550	15' deep, 1-1/2 C.Y. bucket	43.50	83.50	127
4600	18' deep, 2-1/2 C.Y. bucket	60.50	104	165
4650	24' deep, 3-1/2 C.Y. bucket	113	167	280
4800	10' wide, 20' deep, 3-1/2 C.Y. bucket w/trench box	84	127	211
4850	24' deep, 3-1/2 C.Y. bucket	121	176	297
4950	12' wide, 20' deep, 3-1/2 C.Y. bucket w/trench box	90	134	224
4980	25' deep, bucket	137	199	335

G1030 Site Earthwork



The Pipe Bedding System is shown for various pipe diameters. Compacted bank sand is used for pipe bedding and to fill 12" over the pipe. No backfill is included. Various side slopes are shown to accommodate different soil conditions. Pipe sizes vary from 6" to 84" diameter.

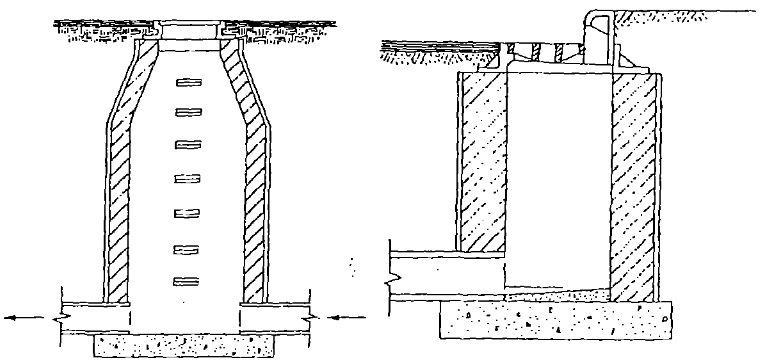
System Components	QUANTITY	UNIT	COST PER L.F. MAT.	COST PER L.F. INST.	COST PER L.F. TOTAL
SYSTEM G1030 815 1440					
PIPE BEDDING, SIDE SLOPE 0 TO 1, 1' WIDE, PIPE SIZE 6" DIAMETER					
Borrow, bank sand, 2 mile haul, machine spread	.067	C.Y.	.74	.42	1.16
Compaction, vibrating plate	.067	C.Y.		.14	.14
TOTAL			.74	.56	1.30

G1030 815	Pipe Bedding	COST PER L.F. MAT.	COST PER L.F. INST.	COST PER L.F. TOTAL
1440	Pipe bedding, side slope 0 to 1, 1' wide, pipe size 6" diameter	.74	.56	1.30
1460	2' wide, pipe size 8" diameter	1.63	1.22	2.85
1480	Pipe size 10" diameter	1.67	1.26	2.93
1500	Pipe size 12" diameter	1.72	1.28	3
1520	3' wide, pipe size 14" diameter	2.83	2.11	4.94
1540	Pipe size 15" diameter	2.86	2.14	5
[illegible]	Pipe size 16" diameter	2.89	2.16	5.05
[illegible]	Pipe size 18" diameter	2.96	2.22	5.18
[illegible]	4' wide, pipe size 20" diameter	4.27	3.20	7.47
1620	Pipe size 21" diameter	4.31	3.23	7.54
1640	Pipe size 24" diameter	4.42	3.32	7.74
1660	Pipe size 30" diameter	4.52	3.39	7.91
1680	6' wide, pipe size 32" diameter	7.90	5.90	13.80
1700	Pipe size 36" diameter	8.10	6.10	14.20
1720	7' wide, pipe size 48" diameter	10.55	7.90	18.45
1740	8' wide, pipe size 60" diameter	13.20	9.85	23.05
1760	10' wide, pipe size 72" diameter	19.05	14.25	33.30
1780	12' wide, pipe size 84" diameter	26	19.35	45.35
2140	Side slope 1/2 to 1, 1' wide, pipe size 6" diameter	1.55	1.17	2.72
2160	2' wide, pipe size 8" diameter	2.57	1.93	4.50
2180	Pipe size 10" diameter	2.79	2.09	4.88
2200	Pipe size 12" diameter	2.98	2.23	5.21
2220	3' wide, pipe size 14" diameter	4.28	3.21	7.49
2240	Pipe size 15" diameter	4.39	3.29	7.68
2260	Pipe size 16" diameter	4.52	3.39	7.91
2280	Pipe size 18" diameter	4.79	3.59	8.38
2300	4' wide, pipe size 20" diameter	6.30	4.74	11.04
2320	Pipe size 21" diameter	6.45	4.85	11.30
2340	Pipe size 24" diameter	6.95	5.20	12.15
2360	Pipe size 30" diameter	7.80	5.80	13.60
2380	6' wide, pipe size 32" diameter	11.45	8.60	20.05
2400	Pipe size 36" diameter	12.25	9.15	21.40
2420	7' wide, pipe size 48" diameter	16.75	12.55	29.30
[illegible]	8' wide, pipe size 60" diameter	22	16.35	38.35
[illegible]	10' wide, pipe size 72" diameter	30.50	23	53.50
[illegible]	12' wide, pipe size 84" diameter	40.50	30.50	71
2620	Side slope 1 to 1, 1' wide, pipe size 6" diameter	2.37	1.77	4.14
2640	2' wide,pipe size 8" diameter	3.55	2.66	6.21

G1030 Site Earthwork

G1030 815	Pipe Bedding	COST PER L.F.		
		MAT.	INST.	TOTAL
2660	Pipe size 10" diameter	3.89	2.92	6.81
2680	Pipe size 12" diameter	4.28	3.21	7.49
2700	3' wide, pipe size 14" diameter	5.75	4.30	10.05
2720	Pipe size 15" diameter	5.95	4.43	10.38
2740	Pipe size 16" diameter	6.15	4.61	10.76
2760	Pipe size 18" diameter	6.60	4.95	11.55
2780	4' wide, pipe size 20" diameter	8.35	6.25	14.60
2800	Pipe size 21" diameter	8.60	6.45	15.05
2820	Pipe size 24" diameter	9.40	7.05	16.45
2840	Pipe size 30" diameter	11	8.25	19.25
2860	6' wide, pipe size 32" diameter	15	11.25	26.25
2880	Pipe size 36" diameter	16.35	12.25	28.60
2900	7' wide, pipe size 48" diameter	23	17.20	40.20
2920	8' wide, pipe size 60" diameter	30.50	23	53.50
2940	10' wide, pipe size 72" diameter	42	31.50	73.50
2960	12' wide, pipe size 84" diameter	55.50	41.50	97

G3030 Storm Sewer



Manhole   Catch Basin

The Manhole and Catch Basin System includes: excavation with a backhoe; a formed concrete footing; frame and cover; cast iron steps and compacted backfill.

The Expanded System Listing shows manholes that have a 4', 5' and 6' inside diameter riser. Depths range from 4' to 14'. Construction material shown is either concrete, concrete block, precast concrete, or brick.

System Components	QUANTITY	UNIT	COST PER EACH MAT.	COST PER EACH INST.	COST PER EACH TOTAL
SYSTEM G3030 210 1920					
MANHOLE/CATCH BASIN, BRICK, 4' I.D. RISER, 4' DEEP					
Excavation, hydraulic backhoe, 3/8 C.Y. bucket	14.815	C.Y.		97.18	97.18
Trim sides and bottom of excavation	64.000	S.F.		51.20	51.20
Forms in place, manhole base, 4 uses	20.000	SFCA	14	87	101
Reinforcing in place footings, #4 to #7	.019	Ton	18.53	20.43	38.96
Concrete, 3000 psi	.925	C.Y.	101.75		101.75
Place and vibrate concrete, footing, direct chute	.925	C.Y.		40.23	40.23
Catch basin or MH, brick, 4' ID, 4' deep	1.000	Ea.	435	850	1,285
Catch basin or MH steps; heavy galvanized cast iron	1.000	Ea.	14.25	11.90	26.15
Catch basin or MH frame and cover	1.000	Ea.	229	195.50	424.50
Fill, granular	12.954	C.Y.	206.62		206.62
Backfill, spread with wheeled front end loader	12.954	C.Y.		26.56	26.56
Air tamp, add	12.954	C.Y.		96.38	96.38
TOTAL			1,019.15	1,476.38	2,495.53

G3030 210	Manholes & Catch Basins	COST PER EACH MAT.	COST PER EACH INST.	COST PER EACH TOTAL
1920	Manhole/catch basin, brick, 4' I.D. riser, 4' deep	1,025	1,475	2,500
1940	6' deep	1,400	2,075	3,475
1960	8' deep	1,825	2,825	4,650
1980	10' deep	2,325	3,450	5,775
3000	12' deep	3,025	3,800	6,825
3020	14' deep	3,800	5,275	9,075
3200	Block, 4' I.D. riser, 4' deep	960	1,175	2,135
3220	6' deep	1,275	1,700	2,975
3240	8' deep	1,675	2,350	4,025
3260	10' deep	1,975	2,875	4,850
3280	12' deep	2,475	3,650	6,125
3300	14' deep	3,050	4,450	7,500
4620	Concrete, cast-in-place, 4' I.D. riser, 4' deep	1,150	2,050	3,200
4640	6' deep	1,600	2,725	4,325
4660	8' deep	2,225	3,975	6,200
4680	10' deep	2,675	4,925	7,600
4700	12' deep	3,300	6,100	9,400
4720	14' deep	4,025	7,300	11,325
5820	Concrete, precast, 4' I.D. riser, 4' deep	1,325	1,075	2,400
5840	6' deep	1,725	1,450	3,175

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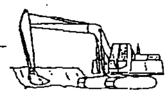
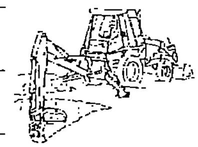
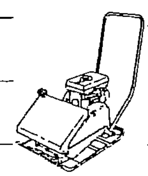
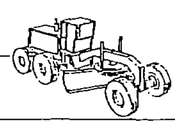
	01 54 33 Equipment Rental	UNIT	HOURLY OPER. COST	RENT PER DAY	RENT PER WEEK	RENT PER MONTH	CREW EQUIPMENT COST/DAY
0120	5/8 C.Y. capacity R015433-10	Ea.	24.05	510	1,525	4,575	497.40
0140	3/4 C.Y. capacity		27.30	550	1,655	4,975	549.40
[illegible]	1 C.Y. capacity		34.70	615	1,845	5,525	646.60
0200	1-1/2 C.Y. capacity 		42.50	815	2,450	7,350	830
0300	2 C.Y. capacity		56.25	1,025	3,050	9,150	1,060
0320	2-1/2 C.Y. capacity		75.95	1,425	4,290	12,900	1,466
0340	3-1/2 C.Y. capacity		118.75	2,300	6,935	20,800	2,337
0341	Attachments						
0342	Bucket thumbs		2.60	215	645	1,925	149.80
0345	Grapples		2.40	187	560	1,675	131.20
0350	Gradall type, truck mounted, 3 ton @ 15' radius, 5/8 C.Y.		46.95	930	2,785	8,350	932.60
0370	1 C.Y. capacity		52.15	1,125	3,360	10,100	1,089
0400	Backhoe-loader, 40 to 45 H.P., 5/8 C.Y. capacity		11.20	215	645	1,925	218.60
0450	45 H.P. to 60 H.P., 3/4 C.Y. capacity		15.05	275	825	2,475	285.40
0460	80 H.P., 1-1/4 C.Y. capacity 		18.10	325	980	2,950	340.80
0470	112 H.P., 1-1/2 C.Y. capacity		24.30	465	1,390	4,175	472.40
0480	Attachments						
0482	Compactor, 20,000 lb		4.70	123	370	1,100	111.60
0485	Hydraulic hammer, 750 ft-lbs		2.70	88.50	265	795	74.60
0486	Hydraulic hammer, 1200 ft-lbs		3.60	162	485	1,450	125.80
0500	Brush chipper, gas engine, 6" cutter head, 35 H.P.		8.40	107	320	960	131.20
0550	12" cutter head, 130 H.P.		13.95	173	520	1,550	215.60
0600	15" cutter head, 165 H.P.		20.90	218	655	1,975	298.20
0750	Bucket, clamshell, general purpose, 3/8 C.Y.		1.05	36.50	110	330	30.40
0800	1/2 C.Y.		1.20	43.50	130	390	35.60
0850	3/4 C.Y.		1.35	53.50	160	480	42.80
0900	1 C.Y.		1.40	58.50	175	525	46.20
0950	1-1/2 C.Y.		2.20	78.50	235	705	64.60
[illegible]	2 C.Y.		2.30	88.50	265	795	71.40
1010	Bucket, dragline, medium duty, 1/2 C.Y.		.60	23.50	70	210	18.80
1020	3/4 C.Y.		.65	24.50	73	219	19.80
1030	1 C.Y.		.65	26	78	234	20.80
1040	1-1/2 C.Y.		1.05	40	120	360	32.40
1050	2 C.Y.		1.10	45	135	405	35.80
1070	3 C.Y.		1.60	55	165	495	45.80
1200	Compactor, manually guided 2-drum vibratory smooth roller, 7.5 H.P.		5.75	162	485	1,450	143
1250	Rammer compactor, gas, 1000 lb. blow 		2.25	41.50	125	375	43
1300	Vibratory plate, gas, 18" plate, 3000 lb. blow		2.20	22.50	67	201	31
1350	21" plate, 5000 lb. blow		2.70	28	84	252	38.40
1370	Curb builder/extruder, 14 H.P., gas, single screw		11.30	238	715	2,150	233.40
1390	Double screw		11.95	278	835	2,500	262.60
1500	Disc harrow attachment, for tractor		.39	64.50	193	580	41.70
1750	Extractor, piling, see lines 2500 to 2750						
1810	Feller buncher, shearing & accumulating trees, 100 H.P.	Ea.	27.30	545	1,630	4,900	544.40
1860	Grader, self-propelled, 25,000 lb.		23.65	445	1,340	4,025	457.20
1910	30,000 lb. 		27.30	525	1,580	4,750	534.40
1920	40,000 lb.		38.60	810	2,425	7,275	793.80
1930	55,000 lb.		51.10	1,150	3,465	10,400	1,102
1950	Hammer, pavement demo., hyd., gas, self-prop., 1000 to 1250 lb.		22.35	325	970	2,900	372.80
2000	Diesel 1300 to 1500 lb.		33.53	645	1,940	5,825	656.25
2050	Pile driving hammer, steam or air, 4150 ft.-lb. @ 225 BPM		7.00	283	850	2,550	226
2100	8750 ft.-lb. @ 145 BPM		8.55	425	1,275	3,825	323.40
2150	15,000 ft.-lb. @ 60 BPM		8.90	460	1,375	4,125	346.20
2200	24,450 ft.-lb. @ 111 BPM		12.35	545	1,635	4,900	425.80
[illegible]	Leads, 20' long for pile driving hammers up to 20,000 ft.-lb.		.95	28.50	85	255	24.60
2300	30' long for hammers over 20,000 ft.-lb.		1.55	71.50	215	645	55.40

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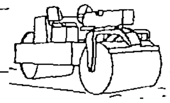
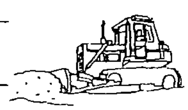
			UNIT	HOURLY OPER. COST	RENT PER DAY	RENT PER WEEK	RENT PER MONTH	CREW EQUIPMENT COST/DAY
20	2350	Diesel type hammer, 22,400 ft.-lb. R015433-10	Ea.	24.85	630	1,895	5,675	577.80
	2400	41,300 ft.-lb.		31.40	685	2,050	6,150	661.20
	2450	141,000 ft.-lb.		47.65	1,175	3,525	10,600	1,086
	2500	Vib. elec. hammer/extractor, 200 KW diesel generator, 34 H.P.		38.80	660	1,975	5,925	705.40
	2550	80 H.P.		69.40	965	2,895	8,675	1,134
	2600	150 H.P.		130.95	1,875	5,650	17,000	2,178
	2700	Extractor, steam or air, 700 ft.-lb.		15.40	480	1,440	4,325	411.20
	2750	1000 ft.-lb.		17.50	600	1,795	5,375	499
	2800	Log chipper, up to 22" diam, 600 H.P.		37.90	450	1,350	4,050	573.20
	2850	Logger, for skidding & stacking logs, 150 H.P.		42.80	875	2,620	7,850	866.40
	2900	Rake, spring tooth, with tractor		10.69	226	678	2,025	221.10
	3000	Roller, vibratory, tandem, smooth drum, 20 H.P.		6.65	128	385	1,150	130.20
	3050	35 H.P.		9.25	242	725	2,175	219
	3100	Towed type vibratory compactor, smooth drum, 50 H.P.		21.20	335	1,010	3,025	371.60
	3150	Sheepsfoot, 50 H.P.		22.20	365	1,100	3,300	397.60
	3170	Landfill compactor, 220 HP		65.95	1,275	3,805	11,400	1,289
	3200	Pneumatic tire roller, 80 H.P.		13.10	340	1,015	3,050	307.80
	3250	120 H.P.		20.00	610	1,825	5,475	525
	3300	Sheepsfoot vibratory roller, 200 H.P.		53.90	960	2,875	8,625	1,006
	3320	340 H.P.		76.10	1,400	4,235	12,700	1,456
	3350	Smooth drum vibratory roller, 75 H.P.		19.55	525	1,570	4,700	470.40
	3400	125 H.P.		25.60	650	1,945	5,825	593.80
	3410	Rotary mower, brush, 60", with tractor		14.45	248	745	2,225	264.60
	3420	Rototiller, 5 HP, walk-behind		2.09	62.50	188	565	54.30
	3450	Scrapers, towed type, 9 to 12 C.Y. capacity		5.95	170	510	1,525	149.60
	3500	12 to 17 C.Y. capacity		6.55	185	555	1,675	163.40
	3550	Scrapers, self-propelled, 4 x 4 drive, 2 engine, 14 C.Y. capacity		113.05	1,625	4,890	14,700	1,882
	3600	2 engine, 24 C.Y. capacity		157.55	2,625	7,845	23,500	2,829
	3640	32 - 44 C.Y. capacity		184.65	3,175	9,495	28,500	3,376
	3650	Self-loading, 11 C.Y. capacity		49.30	890	2,665	8,000	927.40
	3700	22 C.Y. capacity		93.80	1,875	5,610	16,800	1,872
	3710	Screening plant 110 H.P. w/ 5' x 10' screen		30.60	405	1,210	3,625	485.80
	3720	5' x 16' screen		32.70	505	1,520	4,550	565.60
	3850	Shovels, see Cranes division 01590-600						
	3860	Shovel/backhoe bucket, 1/2 C.Y.	Ea.	2.00	58.50	175	525	51
	3870	3/4 C.Y.		2.05	66.50	200	600	56.40
	3880	1 C.Y.		2.15	75	225	675	62.20
	3890	1-1/2 C.Y.		2.30	88.50	265	795	71.40
	3910	3 C.Y.		2.60	123	370	1,100	94.80
	3950	Stump chipper, 18" deep, 30 H.P.		7.60	160	480	1,450	156.80
	4110	Tractor, crawler, with bulldozer, torque converter, diesel 80 H.P.		20.55	360	1,075	3,225	379.40
	4150	105 H.P.		28.80	505	1,510	4,525	532.40
	4200	140 H.P.		34.55	645	1,940	5,825	664.40
	4260	200 H.P.		52.85	1,075	3,240	9,725	1,071
	4310	300 H.P.		67.65	1,400	4,235	12,700	1,388
	4360	410 H.P.		90.40	1,825	5,470	16,400	1,817
	4370	500 H.P.		120.70	2,450	7,320	22,000	2,430
	4380	700 H.P.		179.00	3,750	11,250	33,800	3,682
	4400	Loader, crawler, torque conv., diesel, 1-1/2 C.Y., 80 H.P.		18.90	345	1,030	3,100	357.20
	4450	1-1/2 to 1-3/4 C.Y., 95 H.P.		22.20	435	1,305	3,925	438.60
	4510	1-3/4 to 2-1/4 C.Y., 130 H.P.		29.90	660	1,980	5,950	635.20
	4530	2-1/2 to 3-1/4 C.Y., 190 H.P.		42.80	920	2,755	8,275	893.40
	4560	3-1/2 to 5 C.Y., 275 H.P.		59.85	1,275	3,815	11,400	1,242
	4610	Tractor loader, wheel, torque conv., 4 x 4, 1 to 1-1/4 C.Y., 65 H.P.		13.30	200	600	1,800	226.40
	4620	1-1/2 to 1-3/4 C.Y., 80 H.P.		17.35	273	820	2,450	302.80
	4650	1-3/4 to 2 C.Y., 100 H.P.		19.70	315	940	2,825	345.60





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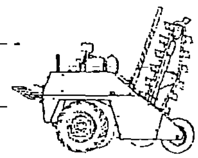
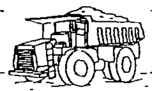
			UNIT	HOURLY OPER. COST	RENT PER DAY	RENT PER WEEK	RENT PER MONTH	CREW EQUIPMENT COST/DAY
20	4710	2-1/2 to 3-1/2 C.Y., 130 H.P. R015433 -10	Ea.	21.55	355	1,070	3,200	386.40
	4730	3 to 4-1/2 C.Y., 170 H.P.		28.00	520	1,560	4,675	536
	4760	5-1/4 to 5-3/4 C.Y., 270 H.P.		45.35	775	2,320	6,950	826.80
	4810	7 to 8 C.Y., 375 H.P.		77.35	1,450	4,340	13,000	1,487
	4870	12-1/2 C.Y., 690 H.P.		106.25	2,225	6,655	20,000	2,181
	4880	Wheeled, skid steer, 10 C.F., 30 H.P. gas		7.50	130	390	1,175	138
	4890	1 C.Y., 78 H.P., diesel		14.05	223	670	2,000	246.40
	4891	Attachments for all skid steer loaders						
	4892	Auger	Ea.	.52	87	261	785	56.35
	4893	Backhoe		.69	116	347	1,050	74.90
	4894	Broom		.71	118	355	1,075	76.70
	4895	Forks		.24	40.50	121	365	26.10
	4896	Grapple		.58	97.50	292	875	63.05
	4897	Concrete hammer		1.02	170	511	1,525	110.35
	4898	Tree spade		.76	127	381	1,150	82.30
	4899	Trencher		.89	148	443	1,325	95.70
	4900	Trencher, chain, boom type, gas, operator walking, 12 H.P.		3.55	46.50	140	420	56.40
	4910	Operator riding, 40 H.P.		11.15	258	775	2,325	244.20
	5000	Wheel type, diesel, 4' deep, 12" wide 		61.55	790	2,375	7,125	967.40
	5100	Diesel, 6' deep, 20" wide		73.90	1,850	5,550	16,700	1,701
	5150	Chain type, diesel, 5' deep, 8" wide		27.45	575	1,725	5,175	564.60
	5200	Diesel, 8' deep, 16" wide		70.75	1,950	5,850	17,600	1,736
	5210	Tree spade, self-propelled		13.30	267	800	2,400	266.40
	5250	Truck, dump, 2-axle, 12 ton, 8 CY payload, 220 H.P.		22.95	208	625	1,875	308.60
	5300	Three axle dump, 16 ton, 12 CY payload, 400 H.P.		40.35	300	900	2,700	502.80
	5350	Dump trailer only, rear dump, 16-1/2 C.Y.		4.50	125	375	1,125	111
	5400	20 C.Y. 		4.85	142	425	1,275	123.80
	5450	Flatbed, single axle, 1-1/2 ton rating		17.65	63.50	190	570	179.20
	5500	3 ton rating		21.25	90	270	810	224
	5550	Off highway rear dump, 25 ton capacity		52.25	1,075	3,240	9,725	1,066
	5600	35 ton capacity		53.15	1,100	3,320	9,950	1,089
	5610	50 ton capacity		69.20	1,450	4,360	13,100	1,426
	5620	65 ton capacity		74.25	1,550	4,615	13,800	1,517
	5630	100 ton capacity		95.45	1,975	5,960	17,900	1,956
	6000	Vibratory plow, 25 H.P., walking		6.20	60	180	540	85.60
40	0010	**GENERAL EQUIPMENT RENTAL** without operators R015433 -10						
	0150	Aerial lift, scissor type, to 15' high, 1000 lb. cap., electric	Ea.	2.60	55	165	495	53.80
	0160	To 25' high, 2000 lb. capacity		3.05	80	240	720	72.40
	0170	Telescoping boom to 40' high, 500 lb. capacity, gas		16.75	310	925	2,775	319
	0180	To 45' high, 500 lb. capacity		17.70	360	1,075	3,225	356.60
	0190	To 60' high, 600 lb. capacity		19.80	475	1,420	4,250	442.40
	0195	Air compressor, portable, 6.5 CFM, electric		.44	12	36	108	10.70
	0196	Gasoline		.73	18	54	162	16.65
	0200	Air compressor, portable, gas engine, 60 C.F.M.		11.55	46.50	140	420	120.40
	0300	160 C.F.M.		13.45	50	150	450	137.60
	0400	Diesel engine, rotary screw, 250 C.F.M.		12.85	98.50	295	885	161.80
	0500	365 C.F.M.		17.35	122	365	1,100	211.80
	0550	450 C.F.M.		22.00	152	455	1,375	267
	0600	600 C.F.M.		38.55	213	640	1,925	436.40
	0700	750 C.F.M.		38.70	222	665	2,000	442.60
	0800	For silenced models, small sizes, add		3%	5%	5%	5%	
	0900	Large sizes, add		5%	7%	7%	7%	
	0920	Air tools and accessories						
	0930	Breaker, pavement, 60 lb.	Ea.	.40	9	27	81	8.60
	0940	80 lb.		.40	9.35	28	84	8.80

How to Use the City Cost Indexes

What you should know before you begin

RSMeans City Cost Indexes (CCI) are an extremely useful tool to use when you want to compare costs from city to city and region to region.

This publication contains average construction cost indexes for 316 U.S. and Canadian cities covering over 930 three-digit zip code locations, as listed directly under each city.

Keep in mind that a City Cost Index number is a percentage ratio of a specific city's cost to the national average cost of the same item at a stated time period.

In other words, these index figures represent relative construction factors (or, if you prefer, multipliers) for Material and Installation costs, as well as the weighted average for Total In Place costs for each CSI MasterFormat division. Installation costs include both labor and equipment rental costs. When estimating equipment rental rates only, for a specific location, use 01543 CONTRACTOR EQUIPMENT index.

The 30 City Average Index is the average of 30 major U.S. cities and serves as a National Average.

Index figures for both material and installation are based on the 30 major city average of *100* and represent the cost relationship as of July 1, 2006. *The index for each division is computed from representative material and labor quantities for that division.* The weighted average for each city is a weighted total of the components listed above it, but does not include relative productivity between trades or cities.

As changes occur in local material prices, labor rates and equipment rental rates, the impact of these changes should be accurately measured by the change in the City Cost Index for each particular city (as compared to the 30 City Average).

Therefore, if you know (or have estimated) building costs in one city today, you can easily convert those costs to expected building costs in another city.

In addition, by using the Historical Cost Index, you can easily convert National Average building costs at a particular time to the approximate building costs for some other time. The City Cost Indexes can then be applied to calculate the costs for a particular city.

Quick Calculations

Location Adjustment Using the City Cost Indexes:

$$\frac{\text{Index for City A}}{\text{Index for City B}} \text{ x Cost in City B} = \text{Cost in City A}$$

Time Adjustment for the National Average Using the Historical Cost Index:

$$\frac{\text{Index for Year A}}{\text{Index for Year B}} \text{ x Cost in Year B} = \text{Cost in Year A}$$

Adjustment from the National Average:

$$\frac{\text{Index for City A}}{100} \text{ x National Average Cost} = \text{Cost in City A}$$

Since each of the other RSMeans publications contains many different items, any *one* item multiplied by the particular city index may give incorrect results. However, the larger the number of items compiled, the closer the results should be to actual costs for that particular city.

The City Cost Indexes for Canadian cities are calculated using Canadian material and equipment prices and labor rates, in Canadian dollars. Therefore, indexes for Canadian cities can be used to convert U.S. National Average prices to local costs in Canadian dollars.

How to use this section

1. **Compare costs from city to city.**

In using the RSMeans Indexes, remember that an index number is not a fixed number but a ratio: It's a percentage ratio of a building component's cost at any stated time to the National Average cost of that same component at the same time period. Put in the form of an equation:

$$\frac{\text{Specific City Cost}}{\text{National Average Cost}} \text{ x } 100 = \text{City Index Number}$$

Therefore, when making cost comparisons between cities, do not subtract one city's index number from the index number of another city and read the result as a percentage difference. Instead, divide one city's index number by that of the other city. The resulting number may then be used as a multiplier to calculate cost differences from city to city.

The formula used to find cost differences between cities for the purpose of comparison is as follows:

$$\frac{\text{City A Index}}{\text{City B Index}} \text{ x City B Cost (Known)} = \text{City A Cost (Unknown)}$$

In addition, you can use RSMeans CCI to calculate and compare costs division by division between cities using the same basic formula. (*Just be sure that you're comparing similar divisions.*)

2. **Compare a specific city's construction costs with the National Average.**

When you're studying construction location feasibility, it's advisable to compare a prospective project's cost index with an index of the National Average cost.

For example, divide the weighted average index of construction costs of a specific city by that of the 30 City Average, which = 100.

$$\frac{\text{City Index}}{100} = \text{\% of National Average}$$

As a result, you get a ratio that indicates the relative cost of construction in that city in comparison with the National Average.

3. **Convert U.S. National Average to actual costs in Canadian City.**

$$\frac{\text{Index for Canadian City}}{100} \text{ x National Average Cost} = \text{Cost in Canadian City in \$ CAN}$$

		TEXAS																	
	DIVISION	BEAUMONT			CORPUS CHRISTI			DALLAS			EL PASO			FORT WORTH			HOUSTON		
		MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL
015433	CONTRACTOR EQUIPMENT		88.4	88.4		95.4	95.4		98.4	98.4		87.3	87.3		87.3	87.3		99.1	99.1
0241, 31 - 34	SITE & INFRASTRUCTURE, DEMOLITION	99.7	85.2	89.6	125.7	80.5	94.2	123.3	86.4	97.6	100.7	84.5	89.4	102.4	85.3	90.5	125.8	84.0	95.2
0310	Concrete Forming & Accessories	105.4	49.5	57.3	98.0	36.3	44.9	95.0	56.0	61.4	97.3	44.4	51.7	93.5	55.2	60.5	94.4	64.1	68.3
0320	Concrete Reinforcing	99.1	40.8	71.0	84.1	46.3	65.9	97.3	52.9	75.9	94.0	45.1	70.4	94.0	52.8	74.1	101.0	60.2	81.3
0330	Cast-in-Place Concrete	92.3	51.5	77.2	100.6	43.4	79.4	93.1	53.2	78.4	87.0	39.0	69.3	95.4	49.0	78.2	95.2	68.7	85.4
03	CONCRETE	91.9	49.4	72.3	88.3	42.6	67.2	88.5	56.0	73.5	86.3	43.5	66.5	90.2	53.3	73.2	91.4	66.5	79.9
04	MASONRY	101.5	58.1	75.5	79.9	50.2	62.2	101.6	58.6	75.9	96.6	47.9	67.5	94.2	58.5	72.9	96.5	60.9	75.2
05	METALS	105.6	62.8	93.1	98.0	75.1	91.4	98.9	80.4	93.5	100.5	60.2	88.8	97.4	66.8	88.5	110.3	87.9	103.8
06	WOOD, PLASTICS & COMPOSITES	112.8	49.9	78.9	112.9	35.7	71.3	97.1	56.4	75.2	100.3	47.2	71.7	100.8	56.3	76.9	97.9	64.4	79.8
07	THERMAL & MOISTURE PROTECTION	104.7	56.7	86.0	95.2	45.3	75.8	94.2	62.8	81.9	95.7	53.8	79.4	100.2	51.9	81.4	97.6	64.1	84.5
08	OPENINGS	95.3	45.8	83.1	107.5	37.2	90.2	104.3	52.3	91.5	92.8	42.7	80.4	86.9	52.2	78.3	105.0	63.2	94.7
0920	Plaster & Gypsum Board	96.3	49.2	67.3	94.3	34.4	57.4	90.9	55.8	69.2	86.4	46.4	61.7	87.3	55.8	67.8	94.7	63.9	75.7
0950, 0980	Ceilings & Acoustic Treatment	100.9	49.2	69.2	87.7	34.4	55.0	94.1	55.8	70.6	89.2	46.4	62.9	91.7	55.8	69.6	101.4	63.9	78.4
0960	Flooring	112.0	73.0	101.4	108.9	44.8	91.4	99.9	54.9	87.6	113.4	64.3	100.1	147.1	43.9	119.1	99.1	60.5	88.6
0990	Wall Finishes & Painting/Coating	94.0	47.9	66.3	106.7	55.7	76.1	100.6	55.3	73.4	96.9	34.1	59.2	98.2	50.7	69.6	101.7	59.8	76.5
09	FINISHES	95.5	53.5	73.5	97.9	39.2	67.2	96.9	55.4	75.2	96.4	47.4	70.7	107.5	52.5	78.7	100.0	62.7	80.5
COVERS	DIVS. 10 - 14, 25, 28, 41, 43, 44	100.0	78.1	95.5	100.0	75.3	94.9	100.0	79.4	95.8	100.0	65.7	93.0	100.0	79.0	95.7	100.0	83.1	96.5
21, 22, 23	FIRE PROTECTION, PLUMBING & HVAC	100.0	61.5	84.2	99.8	42.2	76.2	99.8	65.3	85.6	100.0	36.2	73.8	100.0	54.6	81.4	100.0	69.7	87.5
26, 27, 3370	ELECTRICAL, COMMUNICATIONS & UTIL.	93.8	66.9	80.6	98.4	51.5	75.4	97.2	71.2	84.4	95.1	53.4	74.6	97.2	62.1	79.9	95.8	68.2	82.3
MF2004	WEIGHTED AVERAGE	98.8	60.9	82.6	98.3	50.9	78.0	98.8	65.8	84.6	96.6	50.2	76.8	97.3	59.9	81.3	101.1	70.0	87.8

		TEXAS																	
	DIVISION	LAREDO			LUBBOCK			ODESSA			SAN ANTONIO			WACO			WICHITA FALLS		
		MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL
015433	CONTRACTOR EQUIPMENT		86.7	86.7		97.6	97.6		87.3	87.3		89.6	89.6		87.3	87.3		87.3	87.3
0241, 31 - 34	SITE & INFRASTRUCTURE, DEMOLITION	91.0	85.0	86.8	132.0	83.1	97.9	102.4	85.3	90.5	90.7	90.0	90.2	101.0	85.3	90.1	101.8	85.0	90.1
0310	Concrete Forming & Accessories	92.5	36.6	44.3	97.2	39.3	47.3	97.8	37.3	45.7	92.5	55.2	60.4	98.5	38.8	47.1	98.5	40.4	48.5
0320	Concrete Reinforcing	84.8	46.3	66.3	95.3	48.3	72.6	94.0	48.2	71.9	90.6	49.7	70.9	94.0	47.7	71.7	94.0	48.9	72.[illegible]
0330	Cast-in-Place Concrete	77.5	59.5	70.8	93.2	46.0	75.8	93.1	42.1	74.2	76.0	67.4	72.8	84.0	50.5	71.6	89.7	45.6	73.4
03	CONCRETE	78.6	47.3	64.2	88.4	45.3	68.5	89.3	42.2	67.6	78.8	59.0	69.7	84.8	45.6	66.7	87.7	44.9	67.[illegible]
04	MASONRY	87.5	49.7	64.9	97.8	46.0	66.8	98.5	46.2	67.2	87.3	60.3	71.2	95.2	55.2	71.3	95.7	58.2	73.[illegible]
05	METALS	99.4	61.3	88.3	104.4	78.5	96.9	100.1	63.6	89.5	100.1	66.4	90.3	100.6	64.0	90.0	100.6	65.7	90.[illegible]
06	WOOD, PLASTICS & COMPOSITES	94.5	35.5	62.7	100.8	39.4	67.8	100.7	37.4	66.6	94.5	53.6	72.5	106.9	34.7	68.0	106.9	39.3	70.[illegible]
07	THERMAL & MOISTURE PROTECTION	91.5	50.2	75.4	90.4	47.9	73.8	99.0	43.4	77.3	91.5	63.6	80.6	99.5	47.4	79.2	99.5	52.3	81.[illegible]
08	OPENINGS	100.7	37.8	85.2	104.2	40.3	88.4	92.8	38.9	79.5	102.6	53.6	90.6	86.9	36.1	74.4	86.9	41.9	75.[illegible]
0920	Plaster & Gypsum Board	91.6	34.4	56.3	88.4	38.3	57.5	88.0	36.3	56.1	91.6	52.9	67.7	88.0	33.6	54.4	88.0	38.3	57.[illegible]
0950, 0980	Ceilings & Acoustic Treatment	87.7	34.4	55.0	93.5	38.3	59.6	91.7	36.3	57.7	87.7	52.9	66.3	91.7	33.6	56.1	91.7	38.3	58.[illegible]
0960	Flooring	93.3	44.8	80.1	105.1	37.2	86.6	113.4	36.8	92.6	93.3	68.5	86.6	147.1	34.1	116.4	148.4	77.3	129.[illegible]
0990	Wall Finishes & Painting/Coating	93.6	52.1	68.7	108.4	31.9	62.4	96.9	31.9	57.8	93.6	52.1	68.7	98.2	32.9	58.9	101.9	52.1	72.[illegible]
09	FINISHES	90.5	38.7	63.4	99.7	37.2	66.9	97.4	35.9	65.2	90.5	56.3	72.6	107.6	35.9	70.0	108.2	48.0	76.[illegible]
COVERS	DIVS. 10 - 14, 25, 28, 41, 43, 44	100.0	72.9	94.5	100.0	74.3	94.7	100.0	64.9	92.8	100.0	79.1	95.7	100.0	76.5	95.2	100.0	65.7	93.[illegible]
21, 22, 23	FIRE PROTECTION, PLUMBING & HVAC	99.8	38.0	74.4	99.6	47.6	78.3	100.1	34.6	73.2	99.8	67.1	86.4	100.1	55.3	81.7	100.1	47.4	78.[illegible]
26, 27, 3370	ELECTRICAL, COMMUNICATIONS & UTIL.	100.1	64.8	82.8	95.5	42.3	69.4	97.1	39.4	68.8	100.6	64.8	83.0	97.1	74.0	85.7	99.3	62.4	81.[illegible]
MF2004	WEIGHTED AVERAGE	95.4	51.7	76.7	99.6	51.2	78.9	97.5	45.9	75.4	95.7	65.0	82.6	97.2	56.8	79.9	97.9	55.5	79.[illegible]

		UTAH												VERMONT					
	DIVISION	LOGAN			OGDEN			PROVO			SALT LAKE CITY			BURLINGTON			RUTLAND		
		MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL
015433	CONTRACTOR EQUIPMENT		100.2	100.2		100.2	100.2		99.0	99.0		100.2	100.2		100.6	100.6		100.6	100.[illegible]
0241, 31 - 34	SITE & INFRASTRUCTURE, DEMOLITION	89.2	99.2	96.2	77.9	99.2	92.8	85.8	97.3	93.8	77.7	99.2	92.7	77.3	97.8	91.6	77.2	97.8	91.[illegible]
0310	Concrete Forming & Accessories	102.5	57.1	63.4	102.5	57.1	63.4	103.8	57.3	63.7	102.3	57.3	63.5	95.2	57.5	62.7	98.9	58.1	63[illegible]
0320	Concrete Reinforcing	103.3	72.1	88.3	103.0	72.1	88.1	111.8	72.2	92.7	105.4	72.2	89.4	102.0	84.1	93.4	102.0	84.1	93[illegible]
0330	Cast-in-Place Concrete	91.9	72.0	84.5	93.3	72.0	85.4	92.0	72.0	84.6	102.0	72.0	90.9	95.5	110.5	101.0	88.1	110.7	96[illegible]
03	CONCRETE	111.8	65.5	90.5	101.5	65.5	84.9	111.7	65.6	90.4	121.2	65.6	95.6	105.9	81.0	94.4	102.4	81.4	92[illegible]
04	MASONRY	114.4	60.1	81.9	107.9	60.1	79.3	119.7	60.1	84.0	122.1	60.1	85.0	104.7	55.7	75.4	85.5	55.7	67[illegible]
05	METALS	101.6	72.5	93.2	102.1	72.5	93.5	99.9	72.6	92.0	106.5	72.6	96.7	94.9	78.6	90.2	93.4	79.2	89[illegible]
06	WOOD, PLASTICS & COMPOSITES	85.7	54.1	68.6	85.7	54.1	68.6	87.1	54.1	69.3	87.5	54.1	69.5	94.7	57.9	74.9	100.4	57.9	77[illegible]
07	THERMAL & MOISTURE PROTECTION	97.7	65.8	85.3	96.4	65.8	84.5	99.6	65.8	86.4	99.7	65.8	86.5	99.0	56.0	82.2	99.0	64.8	85[illegible]
08	OPENINGS	88.6	55.7	80.5	88.6	55.7	80.5	92.6	55.7	83.5	90.4	55.7	81.9	105.3	57.5	93.5	105.3	57.5	93[illegible]
0920	Plaster & Gypsum Board	79.9	52.7	63.1	79.9	52.7	63.1	80.3	52.7	63.3	82.2	52.7	64.0	104.7	56.0	74.7	103.7	56.0	74[illegible]
0950, 0980	Ceilings & Acoustic Treatment	106.4	52.7	73.4	106.4	52.7	73.4	106.4	52.7	73.4	100.7	52.7	71.2	89.4	56.0	68.9	90.2	56.0	69[illegible]
0960	Flooring	105.9	55.1	92.1	103.6	55.1	90.4	106.7	55.1	92.7	104.8	55.1	91.3	96.5	63.7	87.6	96.3	63.7	87[illegible]
0990	Wall Finishes & Painting/Coating	98.8	44.9	66.4	98.8	44.9	66.4	98.8	63.3	77.4	101.3	63.3	78.5	91.6	37.2	58.9	91.6	37.2	58[illegible]
09	FINISHES	100.3	54.7	76.4	98.5	54.7	75.6	101.1	56.7	77.9	98.6	56.7	76.7	97.3	55.8	75.6	97.2	55.8	75[illegible]
COVERS	DIVS. 10 - 14, 25, 28, 41, 43, 44	100.0	64.7	92.8	100.0	64.7	92.8	100.0	64.7	92.8	100.0	64.7	92.8	100.0	83.6	96.6	100.0	83.6	96[illegible]
21, 22, 23	FIRE PROTECTION, PLUMBING & HVAC	99.9	67.4	86.5	99.9	67.4	86.5	99.9	67.4	86.5	100.0	67.4	86.6	100.0	65.6	85.9	100.1	65.6	86[illegible]
26, 27, 3370	ELECTRICAL, COMMUNICATIONS & UTIL.	92.7	68.7	80.9	93.0	68.7	81.1	93.3	71.7	82.7	96.2	71.7	84.2	98.2	64.6	81.7	97.8	64.7	81[illegible]
MF2004	WEIGHTED AVERAGE	100.0	67.3	86.0	98.1	67.3	84.9	100.5	67.9	86.5	102.5	68.0	87.8	99.5	69.0	86.4	97.9	69.4	85[illegible]

Abbreviations

A	Area Square Feet; Ampere
ABS	Acrylonitrile Butadiene Styrene; Asbestos Bonded Steel
	Alternating Current; Air-Conditioning; Asbestos Cement; Plywood Grade A & C
A.C.I.	American Concrete Institute
AD	Plywood, Grade A & D
Addit.	Additional
Adj.	Adjustable
af	Audio-frequency
A.G.A.	American Gas Association
Agg.	Aggregate
A.H.	Ampere Hours
A hr.	Ampere-hour
A.H.U.	Air Handling Unit
A.I.A.	American Institute of Architects
AIC	Ampere Interrupting Capacity
Allow.	Allowance
alt.	Altitude
Alum.	Aluminum
a.m.	Ante Meridiem
Amp.	Ampere
Anod.	Anodized
Approx.	Approximate
Apt.	Apartment
Asb.	Asbestos
A.S.B.C.	American Standard Building Code
Asbe.	Asbestos Worker
A.S.H.R.A.E.	American Society of Heating, Refrig. & AC Engineers
A.S.M.E.	American Society of Mechanical Engineers
A.S.T.M.	American Society for Testing and Materials
Attchmt.	Attachment
	Average
	American Wire Gauge
A	American Water Works Assoc.
Bbl.	Barrel
B&B	Grade B and Better; Balled & Burlapped
B.&S.	Bell and Spigot
B.&W.	Black and White
b.c.c.	Body-centered Cubic
B.C.Y.	Bank Cubic Yards
BE	Bevel End
B.F.	Board Feet
Bg. cem.	Bag of Cement
BHP	Boiler Horsepower; Brake Horsepower
B.I.	Black Iron
Bit.; Bitum.	Bituminous
Bk.	Backed
Bkrs.	Breakers
Bldg.	Building
Blk.	Block
Bm.	Beam
Boil.	Boilermaker
B.P.M.	Blows per Minute
BR	Bedroom
Brg.	Bearing
Brhe.	Bricklayer Helper
Bric.	Bricklayer
Brk.	Brick
Brng.	Bearing
Brs.	Brass
Brz.	Bronze
Bsn.	Basin
Btr.	Better
BTU	British Thermal Unit
BTUH	BTU per Hour
	Built-up Roofing
	Interlocked Armored Cable
c	Conductivity, Copper Sweat
C	Hundred; Centigrade
C/C	Center to Center, Cedar on Cedar
Cab.	Cabinet
Cair.	Air Tool Laborer
Calc	Calculated
Cap.	Capacity
Carp.	Carpenter
C.B.	Circuit Breaker
C.C.A.	Chromate Copper Arsenate
C.C.F.	Hundred Cubic Feet
cd	Candela
cd/sf	Candela per Square Foot
CD	Grade of Plywood Face & Back
CDX	Plywood, Grade C & D, exterior glue
Cefi.	Cement Finisher
Cem.	Cement
CF	Hundred Feet
C.F.	Cubic Feet
CFM	Cubic Feet per Minute
c.g.	Center of Gravity
CHW	Chilled Water; Commercial Hot Water
C.I.	Cast Iron
C.I.P.	Cast in Place
Circ.	Circuit
C.L.	Carload Lot
Clab.	Common Laborer
Clam	Common maintenance laborer
C.L.F.	Hundred Linear Feet
CLF	Current Limiting Fuse
CLP	Cross Linked Polyethylene
cm	Centimeter
CMP	Corr. Metal Pipe
C.M.U.	Concrete Masonry Unit
CN	Change Notice
Col.	Column
CO_2	Carbon Dioxide
Comb.	Combination
Compr.	Compressor
Conc.	Concrete
Cont.	Continuous; Continued
Corr.	Corrugated
Cos	Cosine
Cot	Cotangent
Cov.	Cover
C/P	Cedar on Paneling
CPA	Control Point Adjustment
Cplg.	Coupling
C.P.M.	Critical Path Method
CPVC	Chlorinated Polyvinyl Chloride
C.Pr.	Hundred Pair
CRC	Cold Rolled Channel
Creos.	Creosote
Crpt.	Carpet & Linoleum Layer
CRT	Cathode-ray Tube
CS	Carbon Steel, Constant Shear Bar Joist
Csc	Cosecant
C.S.F.	Hundred Square Feet
CSI	Construction Specifications Institute
C.T.	Current Transformer
CTS	Copper Tube Size
Cu	Copper, Cubic
Cu. Ft.	Cubic Foot
cw	Continuous Wave
C.W.	Cool White; Cold Water
Cwt.	100 Pounds
C.W.X.	Cool White Deluxe
C.Y.	Cubic Yard (27 cubic feet)
C.Y./Hr.	Cubic Yard per Hour
Cyl.	Cylinder
d	Penny (nail size)
D	Deep; Depth; Discharge
Dis.;Disch.	Discharge
Db.	Decibel
Dbl.	Double
DC	Direct Current
DDC	Direct Digital Control
Demob.	Demobilization
d.f.u.	Drainage Fixture Units
D.H.	Double Hung
DHW	Domestic Hot Water
Diag.	Diagonal
Diam.	Diameter
Distrib.	Distribution
Div.	Division
Dk.	Deck
D.L.	Dead Load; Diesel
DLH	Deep Long Span Bar Joist
Do.	Ditto
Dp.	Depth
D.P.S.T.	Double Pole, Single Throw
Dr.	Driver
Drink.	Drinking
D.S.	Double Strength
D.S.A.	Double Strength A Grade
D.S.B.	Double Strength B Grade
Dty.	Duty
DWV	Drain Waste Vent
DX	Deluxe White, Direct Expansion
dyn	Dyne
e	Eccentricity
E	Equipment Only; East
Ea.	Each
E.B.	Encased Burial
Econ.	Economy
E.C.Y	Embankment Cubic Yards
EDP	Electronic Data Processing
EIFS	Exterior Insulation Finish System
E.D.R.	Equiv. Direct Radiation
Eq.	Equation
Elec.	Electrician; Electrical
Elev.	Elevator; Elevating
EMT	Electrical Metallic Conduit; Thin Wall Conduit
Eng.	Engine, Engineered
EPDM	Ethylene Propylene Diene Monomer
EPS	Expanded Polystyrene
Eqhv.	Equip. Oper., Heavy
Eqlt.	Equip. Oper., Light
Eqmd.	Equip. Oper., Medium
Eqmm.	Equip. Oper., Master Mechanic
Eqol.	Equip. Oper., Oilers
Equip.	Equipment
ERW	Electric Resistance Welded
E.S.	Energy Saver
Est.	Estimated
esu	Electrostatic Units
E.W.	Each Way
EWT	Entering Water Temperature
Excav.	Excavation
Exp.	Expansion, Exposure
Ext.	Exterior
Extru.	Extrusion
f.	Fiber stress
F	Fahrenheit; Female; Fill
Fab.	Fabricated
FBGS	Fiberglass
F.C.	Footcandles
f.c.c.	Face-centered Cubic
f'c.	Compressive Stress in Concrete; Extreme Compressive Stress
F.E.	Front End
FEP	Fluorinated Ethylene Propylene (Teflon)
F.G.	Flat Grain
F.H.A.	Federal Housing Administration
Fig.	Figure
Fin.	Finished
Fixt.	Fixture
Fl. Oz.	Fluid Ounces
Flr.	Floor
F.M.	Frequency Modulation; Factory Mutual
Fmg.	Framing
Fndtn.	Foundation
Fori.	Foreman, Inside

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2009 Edition

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Design & Construction Resources

	Unit	Total
02110.50 TREE CUTTING & CLEARING (Cont.)		
Loading and trucking		
For machine load, per load, round trip		
1 mile	EA.	84.50
3 mile	EA.	96.00
5 mile	EA.	110
10 mile	EA.	140
20 mile	EA.	210
Hand loaded, round trip		
1 mile	EA.	210
3 mile	EA.	240
5 mile	EA.	270
10 mile	EA.	330
20 mile	EA.	410
02210.10 HAULING MATERIAL		
Haul material by 10 cy dump truck, round trip		
1 mile	C.Y.	4.56
2 mile	C.Y.	5.47
5 mile	C.Y.	7.47
10 mile	C.Y.	8.21
20 mile	C.Y.	9.12
30 mile	C.Y.	11.00
Site grading, cut & fill, sandy clay, 200' haul, 75	C.Y.	3.28
Spread topsoil by equipment on site	C.Y.	3.65
Site grading (cut and fill to 6") less than 1 acre		
75 hp dozer	C.Y.	5.47
1.5 cy backhoe/loader	C.Y.	8.21
02210.30 BULK EXCAVATION		
Excavation, by small dozer		
Large areas	C.Y.	1.64
Small areas	C.Y.	2.74
Trim banks	C.Y.	4.11
Hydraulic excavator		
1 cy capacity		
Light material	C.Y.	3.52
Medium material	C.Y.	4.23
Wet material	C.Y.	5.28
Blasted rock	C.Y.	6.04
1-1/2 cy capacity		
Light material	C.Y.	1.42
Medium material	C.Y.	1.89
Wet material	C.Y.	2.27
Wheel mounted front-end loader		
7/8 cy capacity		
Light material	C.Y.	2.83
Medium material	C.Y.	3.24
Wet material	C.Y.	3.78
Blasted rock	C.Y.	4.53
1-1/2 cy capacity		
Light material	C.Y.	1.62
Medium material	C.Y.	1.74
Wet material	C.Y.	1.89
Blasted rock	C.Y.	2.06
2-1/2 cy capacity		
Light material	C.Y.	1.33
Medium material	C.Y.	1.42
Wet material	C.Y.	1.51
Blasted rock	C.Y.	1.62
Track mounted front-end loader		
1-1/2 cy capacity		
Light material	C.Y.	1.89
Medium material	C.Y.	2.06
Wet material	C.Y.	2.27
Blasted rock	C.Y.	2.52
2-3/4 cy capacity		
Light material	C.Y.	1.13
Medium material	C.Y.	1.26